Credit-Induced Boom and Bust*

Marco Di Maggio
Columbia Business School
mdimaggio@columbia.edu

Amir Kermani
University of California - Berkeley
kermani@berkeley.edu

April 15, 2015

Abstract

Can a credit expansion induce a boom and bust in house prices and real economic activity? This paper exploits the federal preemption of national banks in 2004 from local laws against predatory lending to gauge the effect of the supply of credit on the real economy. Specifically, we exploit the heterogeneity in the market share of national banks across counties and in state anti-predatory laws to instrument for an outward shift in the supply of credit. First, a comparison between counties in the top and bottom deciles of presence of national banks in states with anti-predatory laws suggests that the preemption regulation produced a 15% increase in annual lending in the 2004-2006 period. Our estimates show that this lending increase is associated with a 5% rise in annual house price growth rate and a 3% expansion of employment in the non-tradable sectors. These effects are followed by a decline in loan origination, house prices and employment of similar magnitude in subsequent years. Furthermore, we show that the increase in the supply of credit reduced mortgage delinquency rates during the boom years but increased them in bust years. Finally, these effects are stronger for subprime and inelastic regions.

*We thank Andreas Fuster, Dwight Jaffee, Benjamin Keys, Ross Levine, Chris Mayer, Adair Morse, Tomasz Piskorski, Giorgio Primiceri, Amiyatosh Purnanandam, Christina Romer, David Romer, Philip Schnabl, Anna Scherbina, Johannes Stroebel, James Vickery, Nancy Wallace, and seminar participants at the 2014 NBER Summer Institute Monetary Economics and Real Estate meetings, the 16th Annual Texas Finance Festival, the 10th CSEF-IGIER Symposium on Economics and Institutions, the 2014 Summer Real Estate Symposium, the SF Fed-UCLA conference on Housing and Monetary Policy, the Columbia-NYU Finance meeting, the Joint Central Bank Conference on Monetary Policy and Financial Stability at Bank of Canada, New York Fed, Cornell University, Columbia University and UC Berkeley. We also thank Katrina Evtimova and John Mondragon for excellent research assistance. All remaining errors are our own. We are also grateful to the Paul Milstein Center for Real Estate at Columbia Business School for sharing their data.

1 Introduction

The "Great Recession" was preceded by a very rapid expansion of credit and followed by a collapse in house prices and consumption, which did not regain its pre-recession level for three years. The resulting job decline was sharper than in any recession of recent decades, with unemployment peaking at 10% in October 2009. What role did the financial markets play in these severe fluctuations? Specifically, does an outward shift in the credit supply during the up-phase of the business cycle explain the observed disruptions in the real economy?

This paper inquiries into the way in which an increase in credit supply to riskier borrowers was responsible for the boom and bust cycle in house prices and economic outcomes during the recession. This is important to understand how financial markets affect real economic activity and how fluctuations may be amplified by changes in the supply of credit. But it is hard to isolate credit as a causal variable because of omitted variables and reverse causality. The latter is especially important: counties with faster growth will have higher consumption and higher house prices, but they will also have greater demand for credit. As a result, house price and employment movements will be strongly correlated with credit supply, even if the latter has no direct effect on real estate prices or consumption.

In this paper we estimate the effect of an increase in credit supply to riskier borrowers on economic outcomes using significant changes to US banking regulation in the early 2000s. Starting in 1999, a number of states adopted anti-predatory-lending laws (APL) restricting the terms of mortgage loans to riskier borrowers by such means as requiring verification of ability to repay as well as limits on fees, rates and early repayment penalties. However, in 2004, in an effort to increase home ownership, the Office of the Comptroller of the Currency (OCC) enacted a preemption rule, barring the application of state anti-predatory-lending laws to national banks. In other words, national banks and their mortgage lending subsidiaries were exempted from state APLs and enforcement, while mortgage brokers and independent non-depository lenders, as well as state-chartered depository institutions and

their subsidiaries, were still required to comply.

This setting offers an excellent opportunity to exploit regulatory variations between states and types of lenders to investigate the role of credit supply shocks. The key to our identification strategy is the possibility of comparing economic outcomes in states with and without APLs before and after the OCC preemption rule, but also taking advantage of the substantially uneven presence of national banks in different counties. In particular, APL-state counties in which a large proportion of loans were originated by national banks before 2004 had a positive credit supply shock in the wake of the OCC regulation, as national banks could now grant credit to riskier borrowers with fewer restrictions than other financial institutions. But states with APL might differ from those without, while counties with a stronger presence of national banks might be subject to different shocks than those dominated by local banks. To control for these differences, we compare counties within APL states, thus excluding differences between counties with more and fewer OCC lenders in non-APL states. That is, we use a triple difference-in-difference estimator to gauge the effect of the credit increase on the real economy, pinpointing the effect of the preemption on the availability of lending to riskier borrowers, and then using this as an instrument for the supply of credit during the period preceding the Recession.

Most of the existing literature investigates how an underlying increase in the credit supply, due for instance to the rise of securitization, lax screening standards, or foreign capital inflows, propagates through the economy by using *static regional variations* orthogonal to the initial credit shock, such as the elasticity of housing supply developed by Saiz (2010) or the fraction of subprime borrowers in the region. In contrast, our key contribution is to provide an instrument aimed to directly capture an outward shift in the credit supply to riskier borrowers, which allows us to investigate, controlling for regional differences, how lending to riskier borrowers affects several sectors of the economy. Moreover, the source of variation we use also highlights the potentially adverse consequences of deregulation on the real economy.

There are four main findings. First, comparing counties in the top and bottom deciles of presence of national banks in states with anti-predatory-lending laws, we show that the OCC preemption resulted, through a local general equilibrium effect, in an increase of 11-15% in annual loan issuance.[1] To control for county characteristics in all specifications, we include county and year fixed-effects. We also include other controls such as the county's median income and population, as well as the elasticity measure proposed by Saiz (2010) and the fraction of subprime borrowers to control for the increase in credit demand and collateral values. This is needed in order to show that our instrument is not capturing inter-county differences in the propensity of house price to increase but the variation due to the expansion of credit. To shed light on how this effect varied over time, we examine the boom period 2003-2005 and the bust period 2007-2009 separately, confirming that the counties with a greater presence of OCC lenders in states with APLs had a more pronounced boom-bust cycle in loan origination. These estimates constitute our first stage regression; now we can instrument the supply of credit with the interaction between the presence of national banks in APL states and the post indicator for the period after 2004.

Second, using this as an instrument for the supply of credit to riskier borrowers, we estimate its effect on house prices and find it to be substantial. A 10% increase in loan origination, through a local general equilibrium effect, leads to a 3.3% increase in house prices growth rate, which resulted in a total increase of 10% in house prices during the 2004-2006 period; what is more, our interaction significantly predicts the bust in housing prices. Our estimate is robust to extensive controls for demographics and income differences. And all the specifications explicitly control for the elasticity of house prices, which means that our estimates are not affected by confounding effects unrelated to the shift in credit supply.

Third, we explore the effect of the increase in credit on employment in non-tradable

[1] We emphasize that these estimates are the result of a local general equilibrium effect, because even if the initial shock increased the credit available to subprime borrowers, prime borrowers might have increased their demand for credit as well. For instance, subprime borrowers' higher demand for houses, by increasing collateral values, would indirectly increase the credit available to prime borrowers.

sectors (as defined by Mian and Sufi (2012)), in order to focus on the sectors that are affected mainly by local demand. We find that employment expands significantly more in counties with a large presence of national banks in APL states, even controlling for county characteristics. Specifically, our IV estimates suggest that a 10% increase in loan origination leads to a 2% increase in employment in the non-tradable sectors. And focusing solely on the boom and bust period, the predicted increase in lending is associated with a stronger boom and a sharper bust.

Finally, we examine the effect of the expansion of credit on delinquencies. Interestingly, we find that in counties with more loans originated by OCC lenders in APL states delinquency rates were significantly lower during the boom but surged in the bust period. Comparing counties in the top and bottom deciles of presence of national banks in APL states, the OCC preemption diminished delinquencies by 30% during the boom and increased them by a similar amount during the Recession. Presumably, the increase in lending enabled households to avoid defaults during the upswing by relaxing their borrowing constraints, but aggravated their financial situation during the downturn, making them more fragile.

We also provide evidence of interesting heterogeneous effects across counties. Specifically, if the effects we uncover in the data are due to the relaxation of the borrowers' credit constraint, we should then expect them to be stronger for regions where borrowers face tighter financial constraints. Our proxies to capture the extent of these constraints are the fraction of subprime borrowers in a county; a measure of house affordability, i.e. the ratio of median house price to median income; and the elasticity of housing supply. In all three instances, the results show that the preemption significantly increased the availability of credit to riskier and more constrained borrowers, which confirms our posited mechanism of credit-induced fluctuation.

To check the robustness of our results and weigh potential alternative mechanisms we show several additional results. One concern about our results is the possibility that the presence of national banks could be correlated with the rise in securitization that occurred

during the same period. To rule this out, for each county we compute the fraction of loans that were securitized and use this to proxy for the banks' incentive to increase lending due to securitization. Although securitization is an important predictor for the boom and bust cycle, all the results are completely unaffected, which suggests that our instrument is not correlated with securitization.[2] Second, to show that the results are driven by changes in the states with anti-predatory laws, due to the increase in lending by national banks, rather than by loan origination by other financial institutions in states without APLs, we focus on the states that passed anti-predatory laws by 2004 and estimate a difference-in-differences regression. This test exploits variation between counties, but controls for potential different regional trends due to the rise in securitization or the heterogeneous presence of subprime borrowers. It shows that after 2004 the counties with a higher fraction of national banks are the ones that experienced a more significant increase in loan issuance, house prices and employment and a larger decline in delinquencies. Third, to control further for potential unobserved heterogeneity across counties, we can restrict attention to those at state borders. Since counties on the West coast are much larger than those on the East coast, and the sample of counties close to the borders is small, we construct our main variables at census tract level. Even restricting the investigation to census tracts within fifteen miles of state borders, the results stand confirmed. Fourth, we show that the main effects derive from the increase in loans to households, rather than by lending to small businesses.[3]

Furthermore, since lenders within the same bank-holding company might exploit a form of regulatory arbitrage by switching, for instance, between a lender regulated by the Depart-

[2] For instance, Kermani (2012) shows that regions that experienced larger increase in the fraction of loans that were securitized also exprienced a larger boom and bust in house prices and consumption.

[3] The robustness of our results is further demonstrated by the fact that the predicted lending increases are not associated with an increase in employment in the tradable sectors. Furthermore, we can eliminate the states with the highest delinquency rates and largest housing bubbles, Arizona and Nevada, and show that our results are not driven by those states.

In unreported results, we also show that our estimates are robust even when only states that *eventually* passed an anti-predatory-lending law are considered. In other words, if the concern is that APL and non-APL states are fundamentally different, our results hold when only the timing of the adoption of APL, and not the difference between two "types" of state, is considered.

ment of Housing and Urban Development and an OCC lender, we re-estimate our effects assigning to OCC all the subsidiaries of the bank holding companies, if there is at least a subsidiary regulated by OCC within the bank holding company. Finally, analyzing loan-level data we show that the introduction of the OCC preemption rule resulted in a significant increase in the issuance of "high-cost loans" and mortgages with debt-to-income ratios in the top decile by OCC lenders.[4] This provides further evidence corroborating the mechanism behind our results.[5]

1.1 Related Literature

Our key contribution is to use the deregulation of lending restrictions to directly estimate the causal effect of an increase in credit supply to riskier borrowers on house prices and real economic activity, and its role in generating a distinct boom and bust pattern.

An emerging literature related to this paper studies the effects of house price booms on real economic activity. The most closely related paper is Mian and Sufi (2009). In their seminal paper, Mian and Sufi (2009) show that zip codes with a higher fraction of subprime borrowers experienced unprecedented relative growth in mortgage credit and a corresponding increase in delinquencies. Our own paper makes three significant advances: (1) exploiting an exogenous variation in the supply of credit, we estimate the effect of credit supply on house prices, controlling for local economic shocks; (2) our data enable us to track employment and delinquency rates as well; and (3) we find that the outward shift in the credit supply that followed the preemption regulation significantly predicts both the boom *and* the bust in real economic activity.

There has been abundant evidence of changes in lending during the years preceding the

[4] "High-cost loans" are defined as loans with an annual percentage rate 3 percentage points or more above the Treasury rate for first-lien mortgages with comparable maturities. Mortgages with debt-to-income (DTI) ratios in the top decile usually exhibit DTI above 4.

[5] In a complementary paper, Di Maggio et al. (2015) show that, after the preemption rule, national banks significantly increased the origination of mortgages featuring prepayment penalties, negative amortization and balloon payments by about 10%.

crisis due to different reasons. There are studies on the weakened lending standards (Jiang et al. (2014), Agarwal et al. (2014), Haughwout et al. (2011), Chinco and Mayer (2014) and Barlevy and Fisher (2010)), on the increase in misrepresentations and fraud (Ben-David (2011), Garmaise (2014), Piskorski et al. (2013) and Griffin and Maturana (2014)), on the failure of ratings models and the rapid expansion of non-agency securitization markets (Rajan et al. (2010), Purnanandam (2011), Nadauld and Sherlund (2013) and Keys et al. (2010)). We complement these studies by showing how a significant fraction of the increase in lending can be attributed to changes in the regulatory framework.

Other papers on the interplay between credit, house prices and consumption include Mian et al. (2012), Mian et al. (2013), Greenstone and Mas (2012) and Chodorow-Reich (2014).[6] Mian et al. (2012) instrument foreclosure with the difference between judicial and non-judicial foreclosure states to show that foreclosures cause a significant decline in house prices and residential investment. Mian et al. (2013) show that zip codes where households are more highly leveraged experienced a more severe decline in consumption and employment in the non-tradable sector. The importance of the credit channel for employment is highlighted by Greenstone and Mas (2012), which assesses the role of bank lending to small businesses in the employment decline during the Recession and by Chodorow-Reich (2014) who relates the availability of credit with the employment decline at small and medium firms in the year following the Lehman bankruptcy. Our own paper, by contrast, instruments variations in lending with regulatory changes to show the effect of the increase in lending on the boom and bust in several sectors of the economy through mortgage origination. Furthermore, Mian and Sufi (2012) show that job losses in the non-tradable sector between 2007 and 2009 are significantly more severe in high-leverage counties that experienced sharp demand declines while Adelino et al. (2012) exploits changes in the conforming loan limit as an instrument to gauge the effect of the availability of cheaper financing on house prices. We employ the same

[6] Another related paper is Kleiner and Todd (2007), which finds that the requirement, in place in many states, that mortgage brokers maintain a minimum net worth is associated with smaller numbers of brokers, fewer subprime mortgages, higher foreclosure rates, and a higher percentage of high-interest-rate mortgages.

differentiation as Mian and Sufi (2012) between tradable and non-tradable sectors to show that the increase in lending boosted local demand, which in turn increased employment in the non-tradable sectors. In contrast toAdelino et al. (2012), which employs a local source of variation, ours is at the county level and therefore we would expect a local general equilibrium effect. For instance, our findings on employment are the result of a local general equilibrium effect, which includes the firms' increased borrowing capacity through a collateral channel and its effects on the firms' investment policy (Chaney et al. (2012)).

Finally, Jayaratne and Strahan (1996) show that per capita growth rates in income and output increased significantly following the relaxation of bank branch restrictions in the United States. Favara and Imbs (2015), instead, use the passage of the Interstate Banking and Branching Efficiency Act (IBBEA) in 1994 to show that this deregulation triggered an increase in the demand for housing, that is, that house prices rose because the supply of credit in deregulating states expanded. The present paper, instead, observes an increase in credit supply due to the preemption rule of 2004, which in contrast to the IBBEA targeted subprime lending and riskier borrowers, and shows how it helped to trigger the boom and bust cycle in both real estate and employment for a different sample period.

This paper also contributes to the growing literature on the effects of the decline in lending during the Recession. Ivashina and Scharfstein (2010), for instance, document that new loans to large borrowers fell by 79% between the second quarter of 2007 and the fourth quarter of 2008. They argue that this drop was largely "supply-driven", because of the decline in banks' access to short-term funding following the Lehman Brothers failure. Similarly, Cornett et al. (2011) point out that the banks' efforts to manage the liquidity crisis led to a decline in credit supply. Using Community Reinvestment Act data, Huang and Stephens (2011) and Berrospide and Edge (2010) show that multi-market banks' exposure to markets in which there were housing busts affected the supply of small business loans within all MSAs. Goetz and Valdez (2010) find evidence that differences in the liability structure of small U.S. commercial banks, particularly the use of "non-core" funding, affected lending

patterns during the 2008 crisis. Dagher and Fu (2011) show a positive correlation between the presence of independent mortgage companies and the increase in foreclosure filing rates at the onset of the housing downturn. We complement these studies by providing evidence that part of the decline in lending is the reversal of the initial boom.

Finally, we contribute to the literature on credit booms and financial crisis (see, among others, Jorda' et al. (2011), Schularick and Taylor (2012) and Rajan and Ramcharan (2012)) by showing that the credit supplied by national banks during the economic upswing explains the surge and subsequent collapse in house prices and employment.

The remainder of the paper is organized as follows. Section 2 gives background on the US credit market and regulation. Section 3 provides details on the data sources. Section 4 explains the research design and how it is made operational. Section 5 describes and interprets the main results. Section 6 presents the heterogeneity of treatment effects across regions to provide further evidence of our credit-supply mechanism. Section 7 discusses a number of robustness checks, while Section 8 provides an estimate of the aggregate impact of our results. Section 9 concludes.

2 Regulatory Framework

2.1 Mortgage Regulators

In the United States, residential mortgage lenders are regulated by national and local agencies. Specifically, national banks, Federal thrift institutions and their subsidiaries are supervised by the OCC or the Office of Thrift Supervision (OTS). State banks and state-chartered thrift institutions are supervised by either the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC) or by their chartering state. Credit unions are supervised by the National Credit Union Administration (NCUA), while non-depository mortgage companies are regulated by the Department of Housing and Urban Development (HUD) and the

Federal Trade Commission.

One potential source of concern is the possibility for mortgage companies to shop for the most lenient regulator. However, Agarwal et al. (2012) show that federal regulators are significantly less lenient, downgrading supervisory ratings about twice as frequently as state supervisors, while banks under federal regulators report higher nonperforming loan ratios, more delinquent loans, higher regulatory capital ratios, and lower ROA. Banks accordingly have an incentive to switch from Federal to state supervision, if they are allowed to do so. Moreover, Rosen (2005) explores switching in regulatory agencies between 1970 and 2003, and finds that in the early part of the period most of the switches were due to new banking policies, such as the easing of the ban on interstate banking, whereas after the initial period the main reason for switching was merger with a bank chartered at a different level. Further, the banks that switched tended to be small banks with assets of less than $1 billion.

These findings corroborate our own identification strategy; moreover, the granularity of our dataset allows us to track the banks that changed regulatory agencies, so that we can address any further concerns related to this issue.

2.2 Anti-predatory laws

This dual banking system generated conflicting regulations when several states passed anti-predatory-lending laws and the OCC issued a preemption rule for national banks. In 1994, Congress had passed the Home Ownership and Equity Protection Act (HOEPA) which imposed substantive restrictions on terms and practices for high-priced mortgages, based either on APR or on total points and fees. This regulation aimed to redress abusive high charges for refinancing and home equity loans. However, the thresholds for classifying mortgages as predatory or "high cost" were very high, which significantly reduced the applicability of the restrictions; these "high cost" mortgages, in fact, accounted for just 1 percent of subprime residential mortgages; they represented the most abusive sector of the subprime mortgage

market (Bostic et al. (2008)).

Many states later adopted stronger anti-predatory regulations than federal law requires. Anti-predatory laws seek to prevent various unfair and deceptive practices, such as steering borrowers into loans with a higher interest rate than they could qualify for, making a loan without considering repayment ability, charging exorbitant fees, or adding abusive subprime early repayment penalties, all of which can increase the risk of foreclosure significantly.[7] The first comprehensive state APL law was that of North Carolina in 1999, which was targeted at the subprime mortgage market. As of January 2007, 20 states and the District of Columbia had APL laws in effect.

Potentially, APLs may have different kinds of effects on mortgage market outcomes. On the one hand, the laws might ration credit and raise the price of subprime loans. On the other, they might serve to allay consumer fears about dishonest lenders and ensure that creditors internalize the cost of any negative externalities from predatory loans, which could increase the demand for credit.

There is strong recent evidence that anti-predatory laws had an important role in the subprime market. Ding et al. (2012), for instance, find that they are associated with a 43% reduction in early repayment penalties and a 40% decrease in adjustable-rate mortgages; they are also correlated with a significant reduction in the riskier borrowers' probability of default. In subprime regions (those with a higher fraction of borrowers with FICO scores below 680) these effects are even stronger.

Using 2004 HMDA data, Ho and Pennington-Cross (2006) find that subprime loans originated in states with laws against predatory lending had lower APRs than in unregulated states. Ho and Pennington-Cross (2008) provide additional evidence, focusing on border counties of adjacent states with and without APL to control for labor and housing market characteristics, and using a legal index, they examine the effect of APLs on the probability

[7] Agarwal and Evanoff (2013) provide evidence of unscrupulous behavior by lenders – such as predatory lending – during the housing boom of the 2000s. They show that lenders steered higher-quality borrowers to affiliates that provided subprime-like loans, with APR between 40 and 60 basis points higher.

of subprime applications, originations, and rejections. They find that stronger regulatory restrictions reduced the likelihood of origination and application. Similarly, Elliehausen et al. (2006), using a proprietary database of subprime loans originated by eight large lenders from 1999 to 2004, find that the presence of a law was associated with fewer subprime originations. More recently, Agarwal et al. (2014) estimate the effect on mortgage default rates of a pilot anti-predatory policy in Chicago that required "low-credit-quality" applicants and applicants for "risky" mortgages to submit their loan offers from state-licensed lenders for third-party review by HUD-certified financial counselors. This policy significantly affected both the origination rates and the characteristics of risky mortgages.[8]

Finally, the anti-predatory laws are likely to have had significant impact on the banks' incentives for securitization. In fact, credit rating agencies stated explicitly that after the APLs were enacted they began to require credit enhancement from lenders who might have been in violation of state APLs: "To the extent that potential violations of APLs reduce the funds available to repay RMBS investors, the likelihood of such violations and the probable severity of the penalties must be included in Moody's overall assessment".[9] Evidence of this is also provided by Keys et al. (2010) who study the effect of securitization on lenders' screening decisions and exploit the passage and subsequent repeal of anti-predatory laws in New Jersey (2002) and Georgia (2003) that varied the ease of securitization. They find strong evidence that the incentives to screen the borrowers significantly increased during a period of strict enforcement of anti-predatory lending laws.

We follow this literature employing the measure constructed by Ding et al. (2012), which considers only the states that passed anti-predatory laws that were not just small-scale home ownership and equity protection acts implemented to prevent local regulation.

[8] For a theoretical model of predatory lending see Bond et al. (2009).

[9] Available at http://www.iflr.com/Article/2026825/Predatory-lending-and-RMBS-securitizations-in-the-US.html.

2.3 Preemption Rule

On January 7, 2004 the OCC adopted sweeping regulations preempting, with regard to national banks, a broad range of state laws that sought to regulate the "terms of credit." The measure preempted laws that regulate loan terms, lending and deposit relationships or require a state license to lend. The final rule also provided for preemption when the law would "obstruct, impair, or condition a national bank's exercise of its lending, deposit-taking, or other powers granted to it under federal law", either directly or through subsidiaries. The new regulations effectively barred the application of all state laws to national banks, except where (i) Congress has expressly incorporated state-law standards in federal statutes or (ii) particular state laws have only an "incidental" effect on national banks. The OCC has said that state laws will be deemed to have a permissible "incidental" effect only if they are part of "the legal infrastructure that makes it practicable" for national banks to conduct their federally-authorized activities and "do not regulate the manner or content of the business of banking authorized for national banks," such as contracts, torts, criminal law, the right to collect debts, property acquisition and transfer, taxation, and zoning.[10]

Specifically, the OCC preempted all regulations pertaining the terms of credit, including repayment schedules, interest rates, amortization, payments due, minimum payments, loan-to-value ratios, the aggregate amount that may be lent with real property as security or term to maturity, including the circumstances under which a loan may be called due and payable

[10]For instance, New Century mentioned in its 2004 10-K filing the following: "Several states and cities are considering or have passed laws, regulations or ordinances aimed at curbing predatory lending practices. In general, these proposals involve lowering the existing federal HEPA thresholds for defining a "high-cost" loan, and establishing enhanced protections and remedies for borrowers who receive such loans. [...] Because of enhanced risk and for reputational reasons, many whole loan buyers elect not to purchase any loan labeled as a "high cost" loan under any local, state or federal law or regulation. This would effectively preclude us from continuing to originate loans that fit within the newly defined thresholds. [...] Moreover, some of our competitors who are, or are owned by, national banks or federally chartered thrifts may not be subject to these laws and may, therefore, be able to capture market share from us and other lenders. For example, the Office of the Comptroller of the Currency issued regulations effective January 7, 2004 that preempt state and local laws that seek to regulate mortgage lending practices by national banks." (available at http://www.sec.gov/Archives/edgar/data/1287286/000119312505052506/d10k.htm pag. 45).

after a certain time or upon a specified external event.

This means that starting in 2004 the subprime mortgage market in states with anti-predatory laws was no longer a level playing field: national banks were significantly less constrained by APLs in providing credit to riskier borrowers.

3 Data

We collect data on the new mortgage loans originated every year from 1999 to 2011 through the Home Mortgage Disclosure Act (HMDA) dataset for loan applications, which records the final status (i.e. denied, approved or originated), reason for borrowing (i.e. home purchase, refinancing or home improvement), loan amount, race, sex, income, and home ownership status. We aggregate HMDA data up to the county level and compute the fraction of loans originated by lenders regulated by the OCC. We augment this dataset with information on the fraction of securitized loans by county from Blackbox Logic, a private company that provides a comprehensive, dynamic dataset with information on 21 million privately securitized Subprime, Alt-A, and Prime loans originated after 1999. These loans account for about 90% of all privately securitized mortgages from that period.

As a regional measure of home prices, we use the CoreLogic monthly Home Price Index (HPI) at the county level. This index follows the Case-Shiller weighted repeat-sales methodology to construct a measure of quality-adjusted market prices from 2000 to 2013. They are available for several property categories. We use the single family combined index, which pools all single family structure types (condominiums, detached houses, etc.).

To control for heterogeneity in counties' propensity to experience housing increases due to other factors, we use the elasticity measure proposed by Saiz (2010) and adopted commonly in the literature. To further complement our data concerning the financial conditions of the different counties, we employ data from Equifax, which provides county-level information on loan amounts, mortgage delinquency rates and the fraction of households with FICO scores

under 680.

To determine how the credit expansion affected employment, we extracted the employment data from the County Business Pattern, which allows us to differentiate between tradable and non-tradable sectors (following the classification of Mian and Sufi (2012)). Finally, to control for local credit demand, we also add Census-based county-level data on demographics, income, and business statistics.

Table 1 provides the summary statistics for our main variables, dividing them between static characteristics, as the one we compute in the pre-period, and the changes for the boom and the bust periods, which are used in the cross-sectional analysis. The first point to notice is that there is a significant variation in the fraction of loans originated by OCC lenders, as it varies from 5 percent up to 88 percent. Second, we have information for the elasticity of housing supply only for a subset of counties, as it is computed only for the largest ones. In our analysis, we are going to show that our results hold both for the whole sample and for the more restricted sample of counties for which the elasticity measure is available. Finally, we can also notice that loan amounts as well as employment and house price growth are on average positive during the boom period, 2003-2005, and negative in the bust period 2008-2010. We will confirm these trends exploiting the regulatory changes adopted in the early 2000s to establish a casual link between an outward shift in the credit supply to riskier borrowers and real economic activity.

4 Research Design

Following several recent works showing that firms are not fully able to recover the lost capital when their bank decreases commercial lending (see Khwaja and Mian (2008), Faulkender and Petersen (2006), Sufi (2009), Leary (2009), Lemmon and Roberts (2010), and Chava and Purnanandam (2011)), our identification strategy is designed to exploit the inter-county heterogeneity in exposure to national banks. Figure 1, displaying the distribution of the fraction

of mortgage loans originated by OCC lenders among counties, shows that the importance of national banks does in fact vary significantly.

Moreover, the fraction of loans originated by national banks is also very persistent over time. Figure 2 shows the relation between the fraction of OCC lenders at time 2005 and at 2003 for APL and non-APL states. In both cases the correlation over time is greater than 0.9. This reassures us that using the presence of national banks in 2003 is a good predictor of their presence in subsequent years; moreover, the Figure demonstrates that the passage of the preemption rule in 2004 did not significantly affect the composition of lenders; that is, national banks did not then suddenly increase their presence in the APL states.

To examine in detail our source of variation, Table 2 reports coefficient estimates of cross-sectional regressions relating the presence of national banks to several county characteristics. *Fraction OCC* is the fraction of purchase loans originated by OCC lenders in 2003, while $APL_{g,2004}$ is an indicator variable equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. While the fraction of loans originated by national banks is not correlated with the county's median income (Column 1), it is correlated with several other important features of the local economy. For instance, less populated counties (Column 2) and those with more elastic housing supply (Column 3), fewer subprime borrowers (Column 4), and less intense securitization activity (Column 5) are also regions with a higher fraction of loans originated by national banks. However, these correlations do not differ significantly in states with and without anti-predatory laws, as shown by the lack of significance of the coefficient on the interaction $Fraction\ OCC \times APL_{g,2004}$. In other words, while the fraction of loans originated by national banks is correlated with other important characteristics of the county that may independently have an effect on the credit supply, this correlation does not vary by whether the state adopted an anti-predatory law or not. This suggests exploiting both the fraction of OCC loans and the presence of anti-predatory laws as source of variation to assess the impact of the preemption rule on the credit supply.

Specifically, the main estimation methodology employed here is a triple difference esti-

mator (DDD). The reason for this empirical methodology is twofold. First, the potential problem with difference-in-differences (DD) alone between counties with larger and smaller fractions of OCC lenders is that the estimation might be contaminated by changes in local mortgage market conditions, a possible causal factor in the relative local presence of national banks. Moreover, during this period independent mortgage companies had different source of funding than national banks. A different approach to DD analysis could be to take the counties with higher fractions of OCC lenders in a non-APL state as the control group. But this approach too is problematic, insofar as changes in the availability of credit in counties with a large proportion of national banks might differ systematically between states due to, say, income and wealth differences, rather than the preemption policy. Furthermore, the states that decided to enact an APL might have done so precisely in response to local credit market conditions.

A more robust analysis than either of these DD approaches can be obtained by using as control groups both a different state and a different group within the same APL state. Specifically, we run the following regression

$$\begin{aligned} Log(\text{Loan Amount})_{i,t} &= \lambda_i + \eta_t + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &\quad + \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where i denotes the county, g the state, and t the year of the loan. We measure the county's exposure to the preemption regulation as the fraction of purchase loans originated by OCC lenders in 2003, i.e. in the pre-period. $Post_{2004}$ is a dummy equal to 1 after 2004, the year of the preemption rule, and $APL_{g,t}$ is equal to 1 if state g has an anti-predatory-lending law in place at time t. $X_{i,t}$ is a vector of controls at county level, such as population, income, and the elasticity of house prices. What we are interested in is β_4, namely the coefficient of the triple interaction.

The DDD estimate begins with the change over time in averages for the counties with higher fractions of national banks in the APL state; we then net out the change in means for counties with high fractions of OCC lenders in the non-APL state and the change in means for the counties with low fractions of OCC lenders in the APL state. This is designed to control for two potentially confusing factors: ex ante differential incentives of lenders in different states to supply credit in counties with high fractions of OCC lenders (regardless of preemption) and changes in the mortgage market in all the counties of the APL state (possibly due to other state-wide policies affecting the propensity to lend or changes in the state economy affecting the soundness of lenders).

However, in Section 7 we also report the results from a simpler DD estimation, which exploits only variation between counties with a different presence of national banks focusing on states that passed an anti-predatory law. In this case, we are going to control for county characteristics that might be correlated with the presence of national banks as the ones shown in Table 2.

Now we can present our estimation results. Table 3.A shows the results of (1) estimated on different subsamples. In Columns (1)-(2) we run a panel regression with the log of loan amounts as dependent variable controlling for year and county fixed-effects, and for log of median income and population for the years 2000-2006. The results show that a more substantial presence of national banks in APL states is associated with larger increases in lending. The coefficients for the interaction between fraction of OCC lenders and the Post indicator and between APL and the Post indicator are negative, because lenders without deposit base, such as independent mortgage companies and thrifts, grew faster due to the rise of securitization. Moreover, the passage of APLs made those states less subject to the origination of subprime loans as they banned some of the riskier mortgage practices (Keys et al. (2010)).

Columns (3)-(5) restrict to the sample of counties for which we have the elasticity of housing prices and estimate the same regression with and without controlling for that and

its interaction with the Post indicator. In this case, the magnitude of our main coefficient increases as the elasticity of housing supply is available only for the biggest and urban counties. As shown in Table 2, the fraction of loans originated by national banks in 2003 is negatively correlated with the fraction of subprime borrowers. Therefore, it is not surprising that controlling for the fraction of subprime borrowers, which is an important predictor of the lending boom, changes the coefficient on $OCC_{2003} * Post_{2004}$, but not the coefficient on the triple interaction. To obtain an estimate of the magnitude of our coefficients, we start by noticing that the fraction of loans originated by OCC lenders varies by 0.2 from the top to the bottom decile. Hence, the counties in the top decile of presence of national banks in APL states showed on average 11%-15% (which depends on which coefficient we employ for the calculation) higher annual loan issuance after the preemption than those in the bottom decile.

In Table 3.B we present our cross-sectional results. Columns (1)-(3) restrict attention to the boom period 2003-2005 and run a cross-sectional regression with the change in loan origination as dependent variable, controlling for the change in median income and population, the elasticity of house prices as well as the fraction of subprime borrowers as defined by those with a FICO score below 680. We find that our coefficient is positive and both statistically and economically significant. That is, credit expanded more in the APL-state counties with a higher fraction of national banks than in other counties.

Columns (4)-(6) examine the bust period, 2007-2009, with the change in loan origination as dependent variable, and find that the counties that increased lending most sharply during the boom are the same ones where lending was cut most during the bust. The counties in the top decile of presence of national banks in APL states showed 21% lower annual loan issuance during the bust period than those in the bottom decile. In short, the preemption rule had a significant effect on the credit supply of national banks in APL states.

Note that while for the boom period we can leverage the effect of the preemption rule to study the financial institutions' incentives to increase their mortgage origination, the results

for the bust period cannot rely on it. However, we can show that exactly those counties experiencing a more significant increase in loan originations are the same for which the decline in loan amount, house prices, employment, as well as the increase in delinquency rates, is the most pronounced. Notice that if we had to consider the period 2008-2010, the results would be qualitative similar but less statistically significant. The reason is that most of the decline in loan origination occurred between 2007 and 2008. For the real variables, we consider the period 2008-2010 as we would expect the real economy to respond with a lag to the change in market conditions.

To further check that the differential impact on credit expansion and real economic activities across counties is not driven by differential trends among the counties, and to introduce our main results to be presented in the next section, Figures 3-6 graph the time-series coefficients of the following regressions:

$$\begin{aligned} Log(\mathrm{Y})_{i,t} &= \lambda_i + \eta_t + \sum_{\tau \neq t_0} \beta_{1\tau} APL_{2004} \mathbf{1}_{(\tau=t)} + \sum_{\tau \neq t_0} \beta_{2\tau} OCC_{2003} \mathbf{1}_{(\tau=t)} + \\ & \sum_{\tau \neq t_0} \beta_{3\tau} APL_{2004} * OCC_{2003} \mathbf{1}_{(\tau=t)} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where Y is a vector including our dependent variables: the log of loan amount, the house price growth, the log of the total number of employees in the non-tradable sector and the fraction of delinquent loans. $\mathbf{1}_{(\tau=t)}$ is a dummy variable equal to 1 for year t, and $X_{i,t}$ contains all the other main controls such as the change in the population, change in median income and the elasticity of the supply of houses. We have normalized the coefficient β_{2003} – the year preceding the preemption rule – to zero. APL_{2004} equals one for the states that passed an APL by 2004 and zero otherwise and, to keep the sample constant over time, we have excluded the states that implemented an APL after 2004 (i.e. Wisconsin, Rhode Island and Indiana).

These event studies highlight two main points. First, that in the pre-period there was no

difference in credit supply, house prices, employment and delinquency rates among counties with different fractions of OCC lenders. In other words, the treatment group (counties with a higher fraction of OCC lenders) and the control group (lower fraction) were on parallel trends in the pre-period. Second, Figures 3-6 show the dynamics of the effects we are going to explore in the next section as captured by the coefficient $\beta_{3\tau}$ in 2. All the coefficients become significantly positive right after the implementation of the preemption rule and describe the boom and bust pattern we shall test further in the next sections. For loan amounts, house prices and employment the coefficient picks between 2005 and 2006 and then declines significantly up to the point in which it becomes negative. These results show that the counties with a higher fraction of OCC lenders in states with anti-predatory laws experienced a larger boom and a more severe bust than counties with a lower fraction. Figure 6 shows, instead, the dynamics of our main interaction variable on the delinquency rate, which first decreases until 2007, and then the effect becomes significantly positive starting in 2008. This shows that delinquency rates were first lower for our treatment group up to 2007 and then they became significantly higher. We are going to analyze these effects and the boom and bust pattern in more details exploiting both the longitudinal and cross section variation in our data.

5 Main Results

In this section we examine the effect of the predicted change in the supply of credit to riskier borrowers on house prices, employment, and delinquency rates. Kiyotaki and Moore (1997) provides a model in which the dynamic interaction between a borrowing constraint and asset prices turns out to be a powerful mechanism by which the effects of credit shocks get amplified and result in a boom and bust cycle in real economic activity. More recently, Justiniano et al. (2014) provides a model in which a collateral constraint limits households' ability to borrow against the value of real estate, thus affecting their demand for credit, and a

lending constraint, instead, limiting the flow of funds from financial institutions to mortgage borrowers. Interestingly, they show that a progressive loosening of the lending constraint, rather than the relaxation of collateral requirements, can explain both qualitatively and quantitatively the boom and bust cycle in the housing market.[11]

These results strongly suggest that a shock to the supply of credit to riskier borrowers can generate large and persistent fluctuations in real economic activity and in the next section we provide evidence supporting this hypothesis.

5.1 The Effect of Credit Expansion on House Prices

To estimate the real estate price impact of the credit expansion precisely, controlling for county characteristics, Table 4.A gives the results for the following reduced form equation:

$$\begin{aligned} House\ Prices\ Growth_{i,t} &= \lambda_i + \eta_t + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &\quad + \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

where β_4 is the coefficient of interest. Columns (1)-(2) control for year and county fixed-effects and then add the change in median income and population, while Columns (3)-(5) restrict to the counties for which we have data on the elasticity measure and control for elasticity times Post as an additional control as well as for the fraction of subprime borrowers times the Post. In all specifications the coefficient is positive and significant at 1% level. This shows that the predicted increase in credit supply is in fact associated with a rise in house prices. As in the literature, prices rise less in the counties where the supply of houses is more elastic. The rise in house prices is also correlated negatively with the introduction of anti-predatory-lending laws (which should curb lending to subprime borrowers) and positively with changes in income and population.

[11] Another recent paper trying to explain the boom in house prices is Landvoigt (2011), which shows that optimism about future house price appreciation helps to explain the rise in household debt.

Since we are ultimately interested in how changes in credit supply affect house prices, we can explicitly instrument the credit supply with our main interaction, since we have already shown that this instrument is not correlated with other county characteristics. In column (6) we estimate the effect of an increase in lending by two-stage least squares as follows:

$$\text{House Growth}_{i,t} = \beta \widehat{Loan\ Amount}_{i,t} + \lambda_i + \gamma_t + \Gamma X_{i,t} + \varepsilon_{i,t}$$

where the predicted increase in $\widehat{Loan\ Amount}$ is estimated using the first stage regression (1). This IV estimation implies that a 10 percent increase in the credit supply results in 3.3 percent increase in house price growth between 2003 and 2006, or an overall increase of 10% in prices through a local general equilibrium effect. Equivalently, a comparison between counties in the top and bottom deciles of presence of national banks in states with anti-predatory laws suggests that the preemption regulation resulted in 6% increase in annual house price growth rate. As an additional check we considered the possible weakness of our instrumental variable. We generally find F-statistics above the critical weak identification value of 10 (see Stock (2008)), thus rejecting the hypothesis that the IV is weak.

In Table 4.B we present our cross-sectional results. Columns (1)-(3) restrict attention to the boom period 2003-2005 and run a cross-sectional regression with the change in house prices as dependent variable, controlling for the change in median income and population, the elasticity of house prices and the fraction of subprime borrowers. We find that our coefficient is positive and both statistically and economically significant. That is, house prices increased significantly more in the APL-state counties with a higher fraction of national banks than in other counties. Columns (4)-(6) examine the bust period, 2008-2010, and find that the counties where house prices increased the most during the boom are the same ones where they fell the most during the bust. Even though the identification for the bust period is weaker, as we cannot exploit the introduction of the preemption rule, these cross-sectional results mirror and confirm the pattern highlighted in Figure 4: counties with a stronger

presence of national banks experience a more severe boom and bust cycle in house prices. We also confirm that the presence of subprime borrowers is associated with a more severe boom and bust cycle in house prices.

5.2 The Effect of Credit on Employment

We have estimated the effect of the outward shift in credit supply on aggregate employment following Mian and Sufi (2012). We should expect job gains and losses to be more closely correlated with local demand and with household indebtedness in the non-tradable sector, where industries are classified as non-tradable if they are focused in the retail or restaurant business. Moreover, in order to abstract from any direct effect of the residential housing boom and bust, we explicitly remove construction or any other real-estate related sector from our sample. We hypothesize that an expansion of credit availability boosts local demand and consumption, hence employment.

Table 5.A shows the main results for the non-tradable sector. Columns (1)-(2), tracing the employment during the years 2000-2006, shows that counties with a higher fraction of national banks enjoyed stronger job creation. After controlling for year and county fixed effects the coefficient remains positive and significant. We check robustness by controlling for various county characteristics in columns (3)-(5), and again the coefficient is still positive, statistically significant and economically substantial.

In column (6) we report the IV results. This estimate implies that a 10% increase in loan issuance is associated with a 2.2% increase in employment in the non-tradable sector. Taken together, these results indicate that the credit boom of the early 2000s accounts for a good part of the pre-crisis increase in employment in the non-tradable sector and also for its subsequent collapse.

In Table 5.B we analyze the boom and bust pattern in employment. This evidence complements the findings of Charles et al. (2013) by showing that other sectors within the

non-tradables -in addition to construction - were experiencing a similar increase in employment during the boom period, which masked the general decrease of employment in the manufacturing industry. Columns (1)-(3) restrict attention to the boom period 2003-2005 and run a cross-sectional regression with the change in employment in the non-tradable sector as dependent variable, controlling for the change in median income and population, the elasticity of house prices and the fraction of subprime borrowers. We find that our coefficient is positive and both statistically and economically significant. That is, employment increased significantly more in the counties with a higher fraction of national banks in APL states than in other counties.

Columns (4)-(6) examine the bust period, 2008-2010, and show that the counties where job creation was stronger during the boom are the same ones where employment fell the most during the bust. The boom and bust cycle highlighted by Figure 5 gets confirmed in these estimates and provides further evidence that the outward shift in the credit supply had significant effects on the real economic activity. These results complement the findings of Greenstone and Mas (2012), Chodorow-Reich (2014), Mian and Sufi (2012) and Adelino et al. (2012) by showing how both a boom *and* a bust in employment can be generated by an increase in mortgages granted to households rather than through loans to small firms.

5.3 The Effect of Credit on Delinquency Rates

We have shown that the counties that were presumably affected more significantly by the preemption regulation, because they have a higher fraction of national banks, experienced a more pronounced boom and bust in both house prices and employment. Now we investigate the effects of the expansion of credit on delinquency rates.

Table 6.A reports a formal test of this hypothesis. Columns (1)-(5) report the results from estimating a reduced form similar to (3) with delinquency rate as dependent variable and controlling for various characteristics of the county such as population, income, the elasticity

of housing supply and the fraction of subprime borrowers. As expected, we find that income is negatively correlated with delinquency rates. The coefficient of interest on the effect of the interaction between the APL dummy, the presence of national banks and the Post 2004 indicator is positive and significant in all the specifications. In column (6) we instrument the change in the credit supply with our main interaction. The effect is also economically substantial: the increase in annual loan issuance resulted in a .4% reduction in delinquencies the 2004-2006 period, which is a 30% decrease compared to the 1.3% delinquency rate of 2003.

Table 6.B analyzes the dynamics of this effect in the boom and the bust periods. Columns (1)-(3) give the results for the cross section of counties during the 2003-2005 period: delinquency rates were significantly lower in the counties with a higher fraction of national banks in APL states, even controlling for changes in population and income, for the elasticity of housing supply and the fraction of subprime borrowers.

Finally, columns (4)-(6), for the 2008-2010 period, show that the predicted increases in lending are associated with significantly higher delinquency rates. This suggests that the build-up of debt during the boom made the households more vulnerable in the recession. The effect is even more significant than for the boom period: if we compare counties in the top and bottom deciles of national bank presence in APL states, the OCC preemption resulted in a 30% increase in delinquencies through a local general equilibrium mechanism. In other words, the delinquency rate increased by 1.5% between 2008 and 2010, which is a thirty percent increase with respect to the 4.8% delinquency rate in 2008. We also find that the delinquency rates decline more in subprime regions during the boom period, but then they spike more in inelastic and subprime regions during the bust period. Presumably, risky borrowers managed to stay afloat without defaulting thanks to easy credit and the larger increase in house prices during the boom but were severely affected during the bust and defaulted with higher frequency.

6 Heterogeneous Effects

In the previous section, we have shown that an increase in lending by national banks due to a regulatory change in the U.S. resulted in a more pronounced boom and bust in house prices, employment and delinquency rates for the average county. However, if the effects we uncover in the data are due to the relaxation of the borrowers' credit constraint, we should then expect them to be stronger for regions where borrowers face tighter financial constraints.

Our first proxy for borrowers' creditworthiness is their FICO score. Specifically, we should expect that counties with a higher fraction of subprime borrowers, those with a FICO score below 680, are more affected than prime counties, as the preemption rule affected in particular the availability of credit to riskier borrowers. Table 7 investigates this hypothesis. Odd columns show the results for the boom period when we modify our main interaction variable by including an indicator variable equal to one for counties whose fraction of subprime borrowers is in the top tercile, while prime counties are defined as the ones in the other two terciles. For the loan amount, the house prices, the employment in the non-tradable sector, and the delinquency rates the results are significantly stronger in subprime counties. This confirms our hypothesis and suggests that the preemption regulation benefited significantly more the riskier borrowers. Even columns depict, instead, the effect on the bust period. Even in this case, the effects for the loan amount, the house prices, the employment and the delinquency rates are stronger when we compare subprime counties to the prime ones. In other words, subprime counties are also those that experience more severe downturns.

To further explore the heterogeneous effects of the introduction of the preemption regulation and the resulting increase in loan issuance, we exploit another measure of borrowers' financial constraints: house affordability. That is, we modify our interaction by including a dummy variable that is equal to one for counties with a ratio of median house price to median income in the highest tercile as of 2000. Table 8 shows that counties with least affordable

housing experienced a larger boom in loan amounts, employment in the non-tradable sector and delinquency rates. Moreover, even columns also show that there is a significant larger impact of the outward shift in the credit supply in regions where borrowers face tighter credit constraints due to higher house prices and/or lower income during the bust period.

Finally, we should expect that the response of house prices is greater for inelastic regions, as these are the regions where prices can be more sensitive to an increase in the demand for housing resulting from an increase in the availability of credit. Table 9 confirms this hypothesis by showing that house prices and employment decrease significantly more in inelastic regions, while delinquency rates raise the most in inelastic regions during 2008-2010.

In conclusion, these additional results provide evidence confirming our proposed mechanism that the relaxation of APL for national banks induced them to lend significantly more to borrowers facing tighter credit constraints.

7 Robustness

In this section, we further test the validity of our identification strategy and examine several alternative explanatory hypotheses.

7.1 Securitization

One possible concern about our results is that the presence of national banks could be correlated with the increase in securitization during our period. Or else, given the credit rating concerns about possible violations of the state laws against predatory lending, the national banks' exemption from the laws might have increased their capacity for loan securitization, although it is generally recognized that the key securitization players were independent mortgage lenders, not national banks. In other words, we need to address the objection that our result might be confounded by the rise in the securitization rather than directly by the

outward shift in the supply of credit to riskier borrowers.

To respond to this concern, we have drawn data from BlackBox Logic, the largest provider of data on securitized loans. The database covers 90 percent of all securitized loans, and we have aggregated it at the county level to obtain a reliable, county-by-county measure of securitized loans. Table 10 repeats the main boom-and-bust estimation of the paper for the cross section of counties, but including as an additional control this measure of securitization to show that all the results are robust to such inclusion.[12] Although securitization was one of the most important channels for the increase in the credit supply, unrelated to the preemption rule, neither the magnitude nor the statistical significance of our results change. This suggests that our instrument does not reflect differences in mortgage originators' incentives for securitization, but captures a source of variation that operates by means of the national banks' lending incentives, which contributed to the credit boom.

7.2 Difference-in-Differences

A common issue with difference-in-differences estimations is to rule out the possibility that the results could be driven by changes in the control group, rather than in the treatment group. In our case, this translates to investigate if the boom-and-bust pattern is generated by variation in the states that adopted APLs and in counties with a more significant presence of national banks, rather than by loan origination by other financial institutions, such as independent mortgage lenders, in states without APLs.

To rule out this possibility, we focus on the states that passed APLs by 2004 and estimate a difference-in-differences regression. Specifically, we run the following regression

[12] Similar results for the panel estimates are available from the authors upon request.

$$Y_{i,t} = \lambda_i + \eta_t + \beta_1 Post_{2004} * OCC_{2003} + \beta_2 OCC_{2003} * APL_{g,2004} \quad (4)$$

$$+\beta_3 APL_{g,2004} + \Gamma X_{i,t} + \varepsilon_{i,t}, \quad (5)$$

where i denotes the county, g the state, and t the year. Since we only consider the states that passed an APL by 2004, the coefficient of interest is β_1, i.e. $Post_{2004}$ and $APL_{g,2004}$ are collinear as $APL_{g,2004}$ changes over time but by 2004 it is equal to one for all the states in this sample.

This test exploits variation between counties, but controls for potential different regional trends due to the rise in securitization or the heterogeneous presence of subprime borrowers. Table 11 restricts attention to APL states and reports the results of this robustness check for all the four main variables of interests, controlling for income, population, elasticity of housing supply, and the interaction between the fraction of subprime borrowers and the Post indicator. The coefficient of interest is the interaction between the Post indicator and the fraction of OCC lenders. Although now our sample is reduced by half, Column (1) shows the result for loan amount, which is both statistically and economically significant, and slightly smaller than the one reported in Table 3.A. Columns (2)-(4) report, instead, the results for house prices, employment in the non-tradable sector and delinquency rates. We show that after 2004 the counties with a higher fraction of national banks in states with APLs are the ones that experienced a more significant increase in house prices and employment and a larger decline in delinquencies. Interestingly, the elasticities are very similar to the ones reported in the previous section.

In sum, following this different approach allows us to further confirm our identification strategy, because it shows that the preemption regulation significantly affected the national banks' lending incentives, which through a local general equilibrium effect, has significantly influenced the local real economic activity. We can then conclude that our results are not

driven by potential unobserved changes occurring in states that did not adopt APLs caused by other types of mortgage lenders.

7.3 Evidence from Border Census Tracts

We have controlled for a number of county characteristics, but in order to control for potential unobserved heterogeneity across counties, another approach is to focus on the counties that border on another state. Since counties in the West are much larger than in the East, and the sample of counties at state borders is small, we construct our main variables at the level of census tracts, which produces a highly homogeneous and much larger sample.

We consider only census tract pairs in different states with a maximum distance between them of 10 miles. We have a sample of about 11580 census tracts close to state borders for loan amounts but only about 7500 for house prices, because many of these tracts are rural areas for which house price indexes are not available. In order to run our triple-difference estimator we compute the fraction of loans originated by national banks in 2003 in each census tract.

Table 12 shows the results of the same regression as in (1) for the sample of census tracts on borders and including border times year fixed effects and census tract fixed effects. This controls for any trend specific to the border areas and for unobserved and time-invariant heterogeneity across tracts. Our main interaction coefficient is still highly significant and only slightly smaller than in Table 3.A.

7.4 Other Banking Activities

The preemption regulation radically altered the framework of competition in the mortgage market, giving national banks an advantage in the subprime segment that they could have exploited to earn extra profits and invest them locally. This could have significantly affected the local economy through channels other than credit supply to households. For instance,

the national banks may have used the proceeds of the loans to riskier borrowers during the boom to increase their lending to small businesses, and the relaxation of credit constraints for local businesses could explain the expansion of employment and possibly the rise in house prices as well.

To evaluate this possibility, we have collected data on national banks' lending to small businesses, using the Community Reinvestment Act (CRA) disclosure data from the Federal Financial Institutions Examination Council (FFIEC). The CRA requires banks with assets above $1 billion to report small business lending each year. Greenstone and Mas (2012) estimate that in 2007 CRA-covered banks accounted for 86% of all loans under $1 million. FFIEC provides data by bank, county, and year. We aggregated them by type of lender to compute the total amount lent by national banks to small businesses.

Table 13 shows our main regression (1) using as dependent variable the changes in CRA lending in the boom and bust periods or controlling for these when estimating the effect of preemption on the other main variables. Column (1) traces the effect of preemption on the change in CRA lending during the period 2003-2005 and suggests that in the boom periods lending to small businesses declined as a result of the preemption rule in the APL states. This suggests that our results are not driven by other banking activities, for example, through an increase in lending to firms which might have explained our results for employment, rather these activities decreased significantly in counties with a higher fraction of national banks in APL states. This result confirms the findings of Chakraborty et al. (2013) who show that in the period of 1988 through 2006, banks which are active in strong housing markets increased mortgage lending and decreased commercial lending, which significantly affected the investment policy of the firms that borrowed from these banks. Column (2) shows no significant effect for the bust period. Columns (3)-(8) examine the rise in house prices, employment in the non-tradable sector, and the delinquency rate controlling for changes in CRA lending. CRA lending does not affect either the significance or the magnitude of the coefficient of our main interaction coefficient. This evidence helps to distinguish the

direct credit supply effect from the indirect spillover effect that might have contributed to a county's economic growth. These results are in line with Figure 2, suggesting again that preemption did not significantly affect the mortgage market in any dimension save lending to riskier households.

7.5 Bank Holding Companies

Up to now, we have considered the agency of each different lender in the computation of our measure for the presence of national banks. However, the reported agency for a loan in HMDA is not the agency of the parent company. For instance, Wells Fargo in 2005 had 153 subsidiaries with entries in HMDA, 136 of these are assigned to OCC and 17 are assigned to HUD as reporting agency. We can then investigate how our results would change in the case in which we assign to OCC all the subsidiaries of a bank holding company if at least one of them is regulated by OCC. This additional robustness check allows us to take care of an additional concern: the possibility for lenders to exploit a form of *regulatory arbitrage* by switching, for instance, between a HUD lender and an OCC lender. Specifically, a subsidiary regulated by HUD, and then subject to the APL, can exploit the 2004 preemption rule by issuing mortgages to riskier borrowers through another subsidiary, belonging to the same bank holding company, regulated by the OCC.[13] By considering only the bank holding company regulatory agency, we can correctly assign all the lending of the subsidiary to the BHC when we compute our variable on the fraction of OCC lenders.

We have reproduced all the previous tables with this new measure, however, we report only Table 14, which analyzes the cross-sectional results for all the main dependent variables,

[13] We also analyze in further details the cases of JP Morgan and Countrywide that became OCC lenders at different points in time in our sample. While Countrywide became a national bank only in April 2009, which does not have any effects on our estimates, JP Morgan Chase converted from a state charter (New York) to a national charter in November 2004. We then re-estimated our main results imputing all loans made by JPMorgan Chase in 2003 to OCC in the computation of our fraction of OCC lenders, showing that they are robust to this additional robustness check.

controlling for the expansion of securitization.[14] Odd columns report our results during the boom period, while the even columns analyze the bust period. Interestingly, both the statistical and the economic magnitudes of the effects are equivalent to the one found in the previous section. This reassures us that our source of variation is not confounded by any attempt made by mortgage lenders to exploit laxer regulatory constraints imposed by the different regulatory agencies.

7.6 Long-Run Effects

Is there any long-run effect of the initial outward shift in the credit supply to riskier borrowers on the economy? For instance, was the level of the house prices higher in 2010 then in 2003 as result of the expansion of credit by OCC lenders? To address these questions, in Table 15 we repeat the main estimation of the paper for the cross section of counties, but for the 2003-2010 period.[15] In this way we can test if the loan amounts, the house prices, the employment in the non-tradable sector or the delinquency rates were any different in 2010 than in 2003. All columns include county-level controls, such as the elasticity of housing supply, the changes in population and median income, the fraction of subprime borrowers and the change in the amount of securitized loans.

Column (1) investigates the change in loan amounts and shows that in the counties with a higher fraction of OCC lenders in APL states loan amounts decreased significantly more than elsewhere. This suggests that the contraction in loan amounts, in other words the bust, was more severe than the initial increase. Columns (2) and (3) study the effects on house prices and employment in the non-tradable sector. The coefficients are negative but not statistically significant. This means that the outward shift of the credit supply did not result in a stable increase in economic activity, and that the bust was a full reversal of the initial boom in economic activity observed in the 2003-2006 period. Finally, in Column (4)

[14] The other tables are available upon request from the authors.
[15] We thank James Vickery for suggesting this additional test.

we analyze the effect on delinquencies and find that counties with a higher fraction of national banks in states with anti-predatory laws experienced significantly higher delinquency rates. This suggests that indeed these counties became more fragile, as the increase in delinquencies more than compensate the initial decline due to the expansion of credit and the resulting relaxation of the borrowers' credit constraints.

7.7 Within-County Variation

We can also exploit within county variation by distinguishing loans originated by financial institutions regulated by the different agencies. Specifically, Table 16 shows the regression of home purchase mortgages originated in different counties by banks regulated by the different agencies on the interaction between $APL_{g,t}$, the *Post* indicator and an OCC indicator equal to one if the originator is regulated by the OCC and so exempt from APL and zero otherwise. This means that we have seven different observations, one for each agency, for each county. Column (1) displays the level, showing a significant increase in loans originated by national banks in APL states after 2004, even after controlling for year and agency times county fixed effects, which captures potential time-varying heterogeneity that affect only a subset of financial institutions in each county, e.g. independent mortgage lenders. Column (2) shows the effects on lending growth controlling for county and year fixed effects, and column (3) controls for county-year fixed effects. In both specifications, national banks in APL states increased their lending significantly. These results are consistent with the hypothesis that lenders regulated by the OCC lent more in APL states after the enactment of the preemption regulation, even when we saturate the regression model with fixed effects that capture the time-varying unobserved heterogeneity at the county level.

7.8 Loan-Level Evidence

In order to provide further evidence supporting the mechanism identified in the previous section, we are going to show that the amount of high-cost loans and mortgages with debt-to-income ratios in the top decile increased significantly in states with anti-predatory laws and in regions with a higher presence of national banks.

To this end, we collected data on high-cost loans from HDMA, these are defined as loans with an annual percentage rate 3 percentage points or more above the Treasury rate for first-lien mortgages with comparable maturities (or 5 points over in the case of junior liens). Data on high-cost loans were first provided in the 2004 HDMA dataset.[16] This allows us to investigate if the introduction of the OCC preemption rule resulted in an increase in the issuance of riskier loans by OCC lenders.

Table 17 reports coefficient estimates of weighted least square regressions relating the amount of newly originated high-cost loans by OCC lenders and non-OCC lenders to the passage of anti-predatory laws and the regulatory agency of the loan originator. Since HMDA has reported data on high-cost loans only from 2004 onward, we cannot rely on the DDD identification strategy employed in the preceding sections. Our identification in column (1) comes from states that adopted APL between 2004 and 2007, that is, we can exploit the staggered introduction of the anti-predatory laws to identify the effect of an outward shift in the credit supply on the issuance of riskier mortgages. In column (1) we control for year and county time agency fixed effects and we find a positive and significant effect of the anti-predatory laws in regions with a higher fraction of national banks. In column (2) we analyze the effect on the loan growth and we saturate the model with year, county and agency fixed-effects in order to control for unobserved heterogeneity that might bias our results. We still find a positive and significant result. However, although we control for fixed characteristics at the county level, different counties might react differently to the introduction of the anti-

[16] The indicator of subprime lending used before then was based on loans originated by lenders designated as "sub-prime" lenders by the U.S. Department of Housing and Urban Development.

predatory laws. To alleviate this concern, in column (3) we control for county times year fixed-effects when we estimate the effect on the loan amount growth. Both the significance and the magnitude of the effect remains unaffected.

Finally, let us clarify that the measure of high-cost mortgages provided by HDMA is only an imperfect proxy for the "bad loans" originated in the years preceding the crisis. For instance, this measure does not include loans without any documentation or loans that featured teaser rates due to the definition of high-cost loans based on the interest rate spread. Moreover, the issuance of a high-cost loan does not imply that it is in violation of state APL. Even with these limitations, the results of Table 17 provide evidence that corroborates the interpretation of our previous results: after 2004 national banks had the opportunity to significantly increase their lending to riskier borrowers.

In the same spirit, Table 18 reports the coefficient estimates relating the passage of the preemption rule to newly originated mortgages with debt-to-income ratios in the top decile by OCC lenders and non-OCC lenders.[17] On average, mortgages in the top decile of DTI ratio exhibit a DTI ratio equal to four. One advantage of investigating this type of mortgages is that we can exploit our DDD identification strategy as we have data pre-2004. We study how the preemption affected both the level of newly originated loans with high DTI (Column 1) as well as the growth (Columns 2 and 3). We find that, even in the most conservative specification, when we control for the county-time fixed effects, OCC lenders increased the origination of high-DTI mortgages by 18 percent. This result further confirm that the passage of the preemption rule allowed OCC lenders to increase the issuance of riskier loans.

Additional results on the effects of the preemption rule on the origination of riskier mortgages are presented in the complementary paper by Di Maggio et al. (2015). Specifically, Di Maggio et al. (2015) use more detailed loan-level information to provide further evidence of the microeconomic mechanism underlying our results, and show that the preemption rule

[17] We thank the discussant Benjamin Keys for suggesting this test to us.

significantly affected the propensity of national banks to lend using prepayment penalties, negative amortization and balloon payment by about 10%.

8 Aggregate Implications

In this section, we can employ the results of Section 5 to investigate the aggregate effect of an outward shift in the credit supply on the boom and bust cycle in the US by imposing some additional assumptions.

The first step in integrating our estimated effect to compute the economy-wide magnitude of our results is to compute the ratio between the coefficients on "Fraction OCC x APL" in the loan amount and in the house prices, employment and delinquency estimations reported in Tables 3 through 6. This would give us a measure of the elasticity of all these outcome variables with respect to a change in loan issuance.

Then, for each county, we compute the increase in loan amount and we normalize it by subtracting the 10% decile increase from all of them. This increase in loan amount times the ratio computed previously gives the main effect of interest for each county, which can then be averaged across counties.

As it is common in all the difference-in-differences estimations, deriving the aggregate impact of the estimates is challenging and subject to assumptions. Our case is no exception, in particular, to complete our aggregation exercise, we first need to assume that the local average treatment effect we estimate is equal to the average treatment effect, and then we need to estimate how much of the observed increase in loan amounts is purely due to an increase in the credit supply. From 2003 to 2005, total purchase loan origination amounts increased from $904 billion to $1.37 trillion, and declined to $538 billion in 2009. The first, and according to us unrealistic possibility, is to assume that all the observed loan increase is initiated by an outward shift in the credit supply. This is not going to be true, for instance, in the case in which households' demand for credit increased in response to an increase in

house prices.

Another possibility, which relates directly to our local treatment effect, is to compute the loan amount increase for subprime borrowers. Subprime and Alt-A mortgages increased from $40 billion to $185 billion in the period 2003-2005 to decline almost to zero in 2009.[18] Since our estimates are based on the premise that the APLs have relaxed the credit constraint for riskier borrowers, this is a more compelling assumption. However, notice that the initial credit increase might have mainly affected the subprime borrowers, but due to a local general equilibrium effect working through an increase in collateral values, also prime borrowers might have started to borrow more, which would result in an underestimation of the total effect. Finally, a different assumption is to consider only the states that passed an APL and compute the increase in mortgage origination coming from those states. In these states, total loan amounts increased from $577 billion in 2003 to $833 billion in 2005, to then decline to $334 billion in 2009, whereas subprime loans increased by $90 billion during the same period.

We can now address the following question using our estimates of the elasticity of house prices and employment in the non-tradable sector under the three different scenarios: how much of the variation in house prices, employment and delinquency rates can be attributed to a direct effect of an outward shift in the credit supply? Under the first scenario, in which all the increase in lending was initiated by an increase in the loans supply, for the boom years 2003-2005 the credit channel explains 52% of boom in house prices, 90% in employment in the non-tradable sector and the whole reduction in delinquency rates. For the bust period 2008-2010, the credit supply channel can explain 67% of decline in house prices, 95% decline in employment and 40% of the increase in delinquency.[19] Out of the $460 billion increase in loan amounts, $140 billion comes purely from subprime loans. Then, once we consider only subprime mortgages, the aggregate effect is about one third of what was just computed.

[18] It is worth noticing that these figures are likely to underestimate the increase in subprime mortgages, because they are computed employing the universe of the securitized loans, but not all subprime loans were securitized.

[19] This confirms that even under this unrealistic assumption, our elasticities do not result in explaining more than 100% of the variation in house prices, employment and delinquency rates.

Finally, when we consider only APL states, which account for roughly 50%-60% of the loan increase in the US, we have that our aggregate effect is halved.

In sum, we have that the credit supply channel can explain, for instance, between 20% and 60% of the boom and bust cycle in house prices, and at least 30% of the fluctuation in employment and delinquency rates. None of the assumptions discussed above is perfect, but we believe that they can still provide a reasonable range of estimates for the aggregate effects of an outward shift in the credit supply, which shows that indeed a positive shock to the credit supply might have been the cause of a significant portion of the fluctuations observed in the real economic activities.

9 Conclusion

This paper exploits major changes in banking regulation that had differential effects on the states with and without anti-predatory-lending laws, and on counties with differing degrees of presence of national banks. This enables us to develop a novel identification strategy for inquiring into the role of the supply of credit to riskier borrowers in helping to generate the boom and bust in house prices and real economic activity in the first decade of the century.

We make four main findings. First, the counties that were more strongly affected by the regulation – i.e. those with a larger presence of national banks in APL states – display significantly greater loan origination, an increase of 18% during the 2004-2006 period. Second, house prices rise markedly more in these counties during the boom but they also fall more steeply during the bust. Third, there is evidence that the increase in credit supply affected real economic activity; that is, increases in employment in the non-tradable sector are associated with the predicted increases in lending to riskier borrowers. Fourth, there is also evidence that the credit boom was preliminary to a rise in delinquency rates when the housing market turned down. Moreover, these findings are robust to several robustness checks.

In conclusion, we believe that this study sheds new light on the impact of credit boom on the real economy and on the way the effect spread across the U.S. between 2002 and 2006. Specifically, we can assign a significant portion of the economic fluctuations observed before and after the crisis to an outward shift in the supply of credit to riskier households, which amplified the boom and bust cycle in several sectors of the economy.

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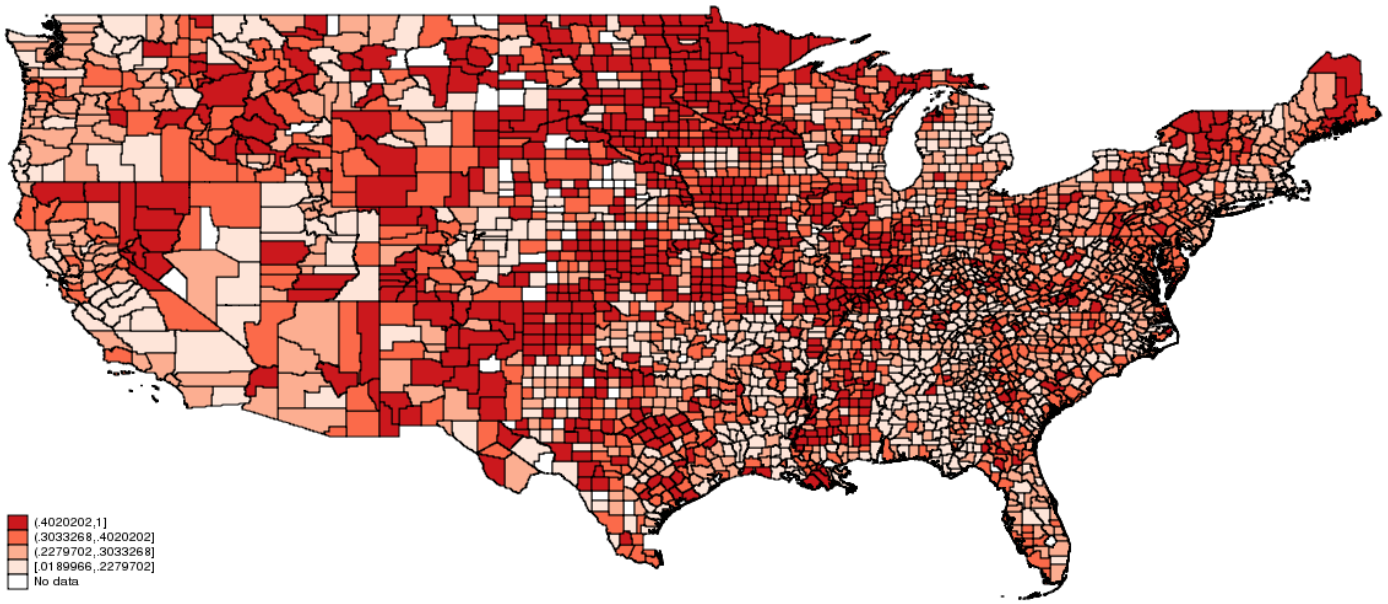

Figure 1- Fraction of Lending Done by National Banks in 2003 for Each County

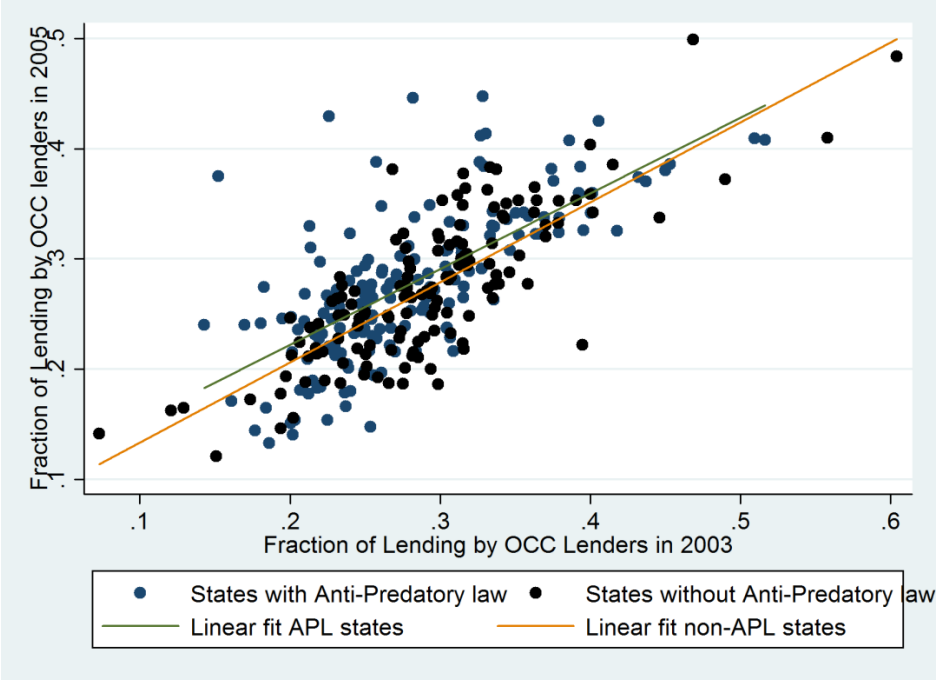

Figure 2 – The Relation between the Fraction of Lending Done by National Banks in 2003 and in 2005 for Each County

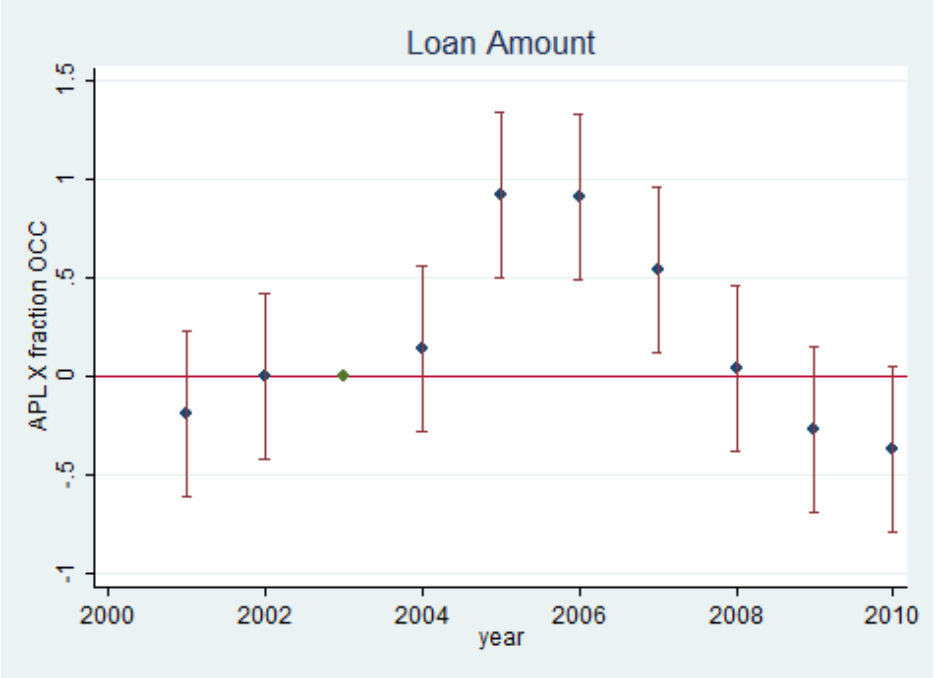

Figure 3- Preemption of national banks from states Anti-Predatory law (APL) and changes in loan amounts.

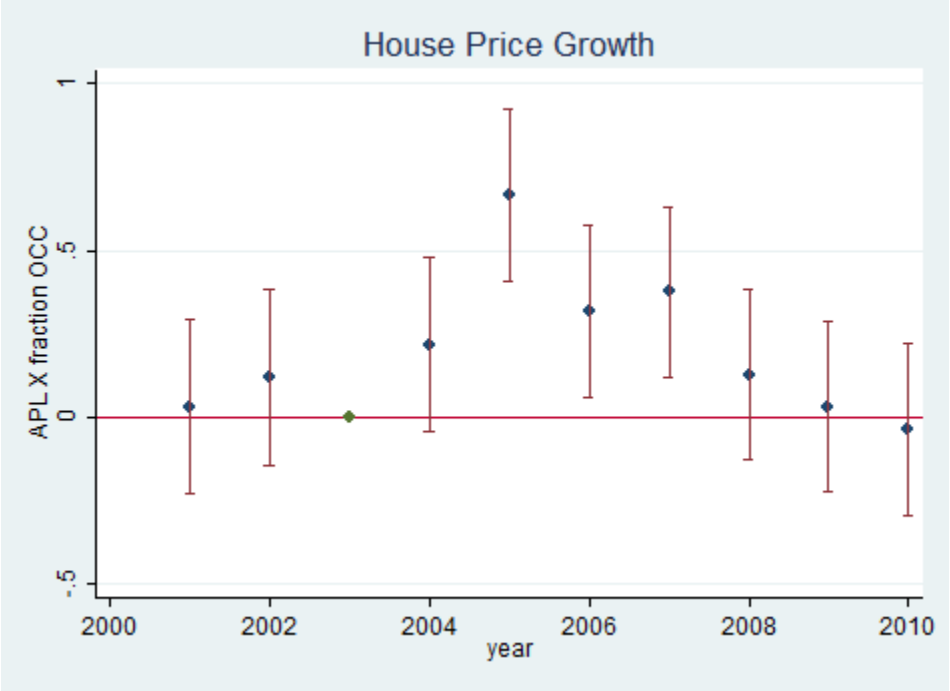

Figure 4- Preemption of national banks from states Anti-Predatory law (APL) and changes in house prices growth.

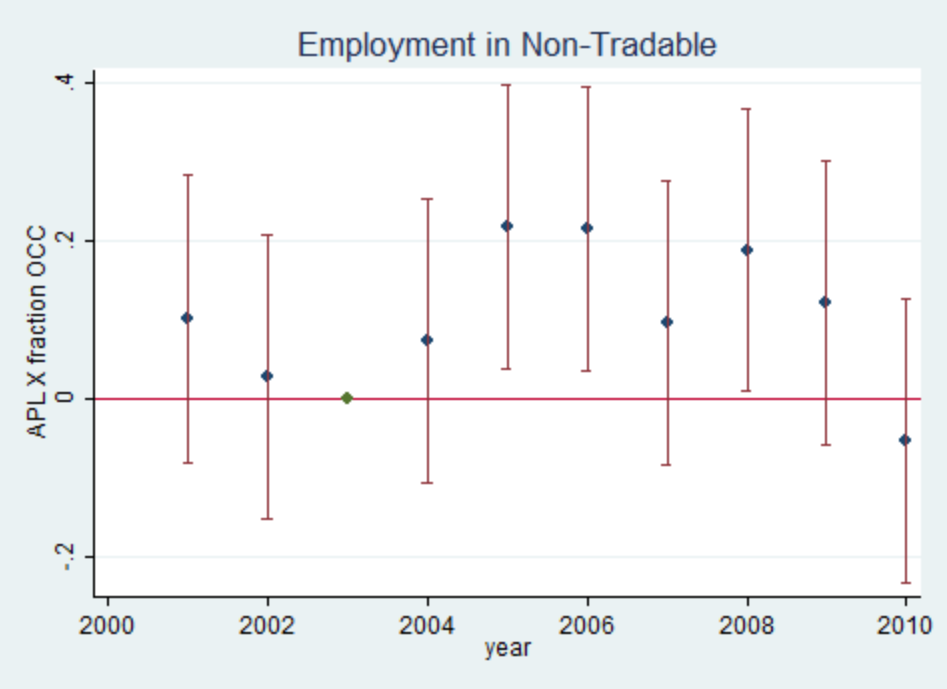

Figure 5- Preemption of national banks from states Anti-Predatory law (APL) and changes in employment in non-tradable sectors.

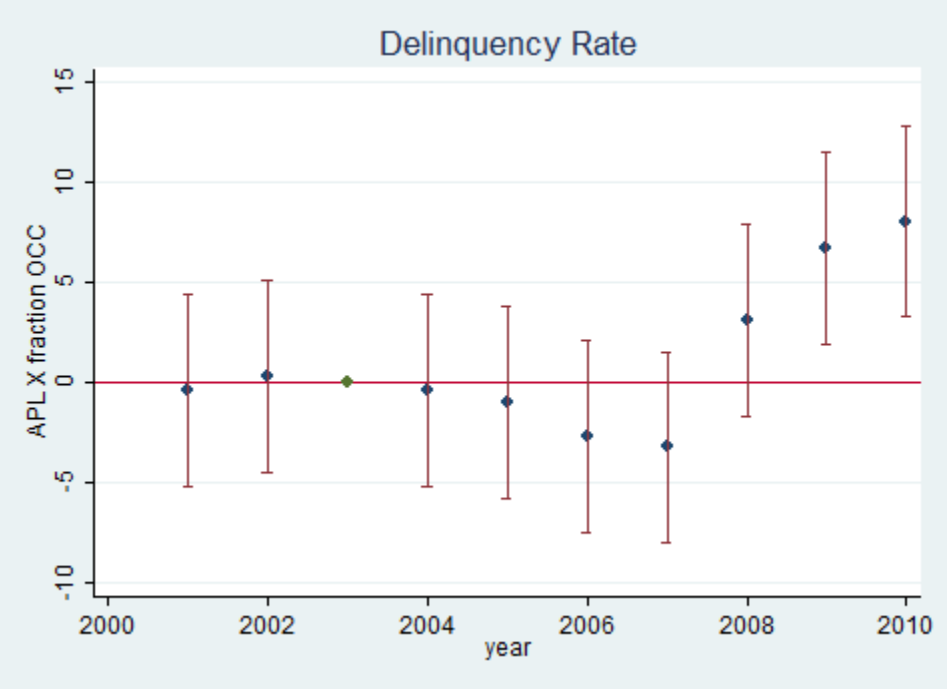

Figure 6- Preemption of national banks from states Anti-Predatory law (APL) and changes in delinquency rates.

Table 1

Summary Statistics

The table reports descriptive statistics for the main variables employed in our analysis. Loan Amount is computed using HDMA data, and denotes the value of mortgages to purchase a home by mortgage lenders in the period 2000-2011. Data on Population and Income are from the Census. House prices are from CoreLogic and are aggregated at the county level. The Fraction of OCC lenders in 2003 is the share of loans originated by all the mortgage lenders regulated by The Office of the Comptroller of the Currency (OCC) as of 2003, and is computed using data from HDMA. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. Fraction of Securitized loans come from BlackBox Logic, which covers 90% of the securitization market.

		1	2	3	4	5
		N	Mean	Standard Deviation	Min	Max
Static Characteristics	Fraction of OCC lenders in 2003	2,219	0.31	0.13	0.05	0.88
	Elasticity of housing supply	770	2.36	1.25	0.6	12.15
	Log Median Income in 2003	2,219	10.54	0.23	9.82	11.44
	Log Population in 2003	2,219	10.66	1.12	9.04	15.84
	Fraction Borrowers with FICO<680 in 2003	2,219	0.47	0.11	0.2	0.8
Change from 2003-2005	Log Median Income	2,220	0.06	0.04	-0.15	0.28
	Log Population	2,219	0.03	0.04	-0.32	0.20
	Fraction of Loans Securitized	2,211	0.14	0.08	-0.68	0.76
	Log Loan amounts	2,219	0.36	0.23	-0.77	1.82
	House prices	679	0.22	0.15	-0.28	1.09
	Log Employment in non-tradable sector	760	0.04	0.11	-0.40	0.94
Change from 2008-2010	Log Median Income	2,220	-0.01	0.05	-0.28	0.21
	Log Population	2,220	0.01	0.02	-0.07	0.13
	Log Loan amounts	2,220	-0.27	0.22	-1.27	1.07
	House prices	714	-0.08	0.10	-0.49	0.16
	Log Employment in non-tradable sector	765	-0.06	0.07	-0.33	0.32

Table 2

Presence of National Banks as Source of Variation

The table reports coefficient estimates of cross-sectional regressions relating the presence of national banks to several county characteristics. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "APL$g,_{2004}$" is equal to 1 if state *g* has an anti-predatory-lending law in place by 2004 and zero otherwise. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. Fraction of Securitized loans come from BlackBox Logic, which covers 90% of the securitization market. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. All regressions are weighted by the the population of each county. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Median Income in 2000	*Population in 2000*	*Elasticity of Housing Supply*	*Fraction of Subprime in 2000*	*Securitization*
$APL_{g,2004}$ × Fraction OCC	-0.20	-1.94	-2.04	0.12	-0.04
	(0.17)	(1.31)	(1.55)	(0.10)	(0.09)
$APL_{g,2004}$	0.16***	1.10**	0.50	-0.04	0.05
	(0.06)	(0.54)	(0.47)	(0.03)	(0.04)
Fraction OCC_{2003}	0.13	-3.21***	6.04***	-0.27***	-0.25***
	(0.09)	(0.72)	(1.02)	(0.06)	(0.06)
Constant	10.58***	13.15***	0.11	0.48***	0.27***
	(0.03)	(0.29)	(0.31)	(0.02)	(0.02)
Observations	2,219	2,219	770	764	2,209
R-squared	0.05	0.10	0.11	0.03	0.10

Table 3.A

Preemption of National Banks and Boom-Bust in Loan Origination

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans to the preemption of national banks with weights equal to the population of each county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5
	Log of Loan amount				
	Full Sample		*Counties with Elasticity and FICO Measure*		
APLg,t × Post × Fraction OCC	0.449***	0.472***	0.949***	0.915***	0.717***
	(0.133)	(0.120)	(0.223)	(0.189)	(0.182)
APLg,t × Post	-0.174***	-0.196***	-0.324***	-0.329***	-0.277***
	(0.0477)	(0.0416)	(0.0703)	(0.0589)	(0.0555)
Post × Fraction OCC	-0.537***	-0.446***	-0.836***	-0.668***	-0.255*
	(0.0987)	(0.0877)	(0.173)	(0.149)	(0.140)
APLg,t × Fraction OCC	-0.242***	-0.156	-0.258	-0.254	-0.204
	(0.0935)	(0.101)	(0.170)	(0.158)	(0.162)
APLg,t	0.0546	0.0384	0.0676	0.0841*	0.0635
	(0.0342)	(0.0363)	(0.0544)	(0.0508)	(0.0520)
Log(Median Income)		1.552***	1.725***	1.731***	1.431***
		(0.142)	(0.157)	(0.143)	(0.156)
Log(Population)		1.191***	1.196***	1.180***	1.293***
		(0.156)	(0.184)	(0.174)	(0.164)
Fraction Subprime X Post				0.804***	1.017***
				(0.112)	(0.112)
Elasticity X Post					-0.0658***
					(0.00867)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes	Yes
Observations	21,564	15,533	5,348	5,348	5,348
R-squared	0.020	0.147	0.233	0.233	0.267
Number of counties	3,085	2,219	764	764	764

Table 3.B

Preemption of National Banks and Boom-Bust in Loan Origination

The table reports coefficient estimates of weighted least square regressions relating the change in newly originated purchase loans to the preemption of national banks with weights equal to the population of each county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	Change in Loan Amount in 2003-2005			*Change in Loan Amount in 2007-2009*		
$APLg_{,2004}$ × Fraction OCC	0.442***	0.904***	0.741***	-0.573***	-1.011***	-0.847***
	(0.134)	(0.215)	(0.198)	(0.197)	(0.349)	(0.314)
$APLg_{,2004}$	-0.232***	-0.373***	-0.320***	0.190**	0.322***	0.280***
	(0.0489)	(0.0702)	(0.0637)	(0.0755)	(0.118)	(0.106)
Fraction OCC	-0.380***	-0.634***	-0.330**	0.861***	1.356***	0.902***
	(0.102)	(0.161)	(0.149)	(0.149)	(0.268)	(0.210)
Change in Income	1.561***	1.903***	1.493***	1.181***	1.134***	1.149***
	(0.150)	(0.158)	(0.166)	(0.260)	(0.339)	(0.328)
Change in Population	1.860***	1.867***	1.961***	1.583***	1.408**	0.834
	(0.228)	(0.266)	(0.261)	(0.496)	(0.552)	(0.520)
Fraction of Subprime		0.564***	0.724***		-0.567***	-0.822***
		(0.0947)	(0.0980)		(0.168)	(0.185)
Elasticity			-0.0517***			0.0669***
			(0.00802)			(0.0149)
Observations	2,214	760	760	2,214	760	760
R-squared	0.266	0.415	0.462	0.131	0.217	0.281

Table 4.A

Preemption of National Banks and Boom-Bust in House Prices

The table reports coefficient estimates of weighted least square regressions relating house prices to the preemption of national banks and the increase in the supply of loans induced by the preemption where the weights are given by the population of each county. House prices are from CoreLogic. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. In column 6, "APL × Post × Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	House Prices Growth					
	Full Sample		*Counties with Elasticity Measure*			
						IV
APLg,t × Post × Fraction OCC	0.247***	0.215***	0.273***	0.273***	0.236***	
	(0.0547)	(0.0484)	(0.0643)	(0.0643)	(0.0617)	
Instrumented Log of Loan Amounts						0.333***
						(0.109)
APLg,t × Post	-0.107***	-0.0993***	-0.120***	-0.120***	-0.108***	-0.0178*
	(0.0176)	(0.0158)	(0.0197)	(0.0197)	(0.0192)	(0.00957)
Post × Fraction OCC	-0.200***	-0.166***	-0.174***	-0.174***	-0.0912*	0.0232
	(0.0388)	(0.0335)	(0.0483)	(0.0483)	(0.0475)	(0.0433)
APLg,t × Fraction OCC	-0.117**	-0.0645	-0.0640	-0.0640	-0.0618	0.0170
	(0.0597)	(0.0446)	(0.0574)	(0.0574)	(0.0594)	(0.0515)
APLg,t	0.0288	0.0206	0.0262	0.0262	0.0239	-0.00542
	(0.0195)	(0.0155)	(0.0191)	(0.0191)	(0.0196)	(0.0162)
Fraction of Subprime × Post			0.193***	0.193***	0.233***	-0.185
			(0.0370)	(0.0370)	(0.0378)	(0.146)
Elasticity × Post					-0.0124***	0.0150
					(0.00312)	(0.00997)
Log(Median Income)		0.200***	0.239***	0.239***	0.190***	-0.0852
		(0.0443)	(0.0510)	(0.0510)	(0.0517)	(0.0900)
Log(Population)		0.219**	0.162	0.162	0.220*	-0.0458
		(0.111)	(0.129)	(0.129)	(0.115)	(0.176)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,244	5,322	3,258	3,258	3,258	3,258
R-squared	0.063	0.077	0.113	0.113	0.128	-0.160
Number of counties	892	887	543	543	543	543

Table 4.B

Preemption of National Banks and Boom-Bust in House Prices

The table reports coefficient estimates of weighted least square regressions relating the change in house prices to the preemption of national banks and the increase in the supply of loans induced by the preemption, where the weights are given by the population of each county. House prices are from CoreLogic. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)
	Change in House Prices in 2003-2005			*Change in House Prices in 2008-2010*		
$APLg_{,2004}$ × Fraction OCC	0.423***	0.571***	0.352*	-0.399***	-0.650***	-0.518***
	(0.146)	(0.208)	(0.192)	(0.143)	(0.198)	(0.182)
$APLg_{,2004}$	-0.183***	-0.236***	-0.165***	0.150***	0.227***	0.191***
	(0.0487)	(0.0662)	(0.0615)	(0.0500)	(0.0651)	(0.0597)
Fraction OCC	-0.398***	-0.493***	-0.143	0.474***	0.693***	0.415**
	(0.0967)	(0.152)	(0.142)	(0.130)	(0.182)	(0.169)
Change in Median Income	1.695***	1.755***	1.323***	-0.323**	-0.355*	-0.155
	(0.164)	(0.190)	(0.165)	(0.146)	(0.184)	(0.179)
Change in Population	0.646***	0.641***	0.739***	1.241***	1.164***	0.613*
	(0.208)	(0.231)	(0.209)	(0.306)	(0.350)	(0.325)
Fraction of Subprime		0.0418	0.220***		-0.110	-0.252***
		(0.0753)	(0.0796)		(0.0799)	(0.0772)
Elasticity			-0.0566***			0.0416***
			(0.00891)			(0.00532)
Observations	882	539	539	882	539	539
R-squared	0.423	0.444	0.530	0.132	0.175	0.283

Table 5.A

Preemption of National Banks and Boom-Bust in Employment in Non-Tradable Sector

The table reports coefficient estimates of WLS regressions relating employment in non-tradable sectors to the preemption of national banks and the increase in the supply of loans induced by the preemption, with weights equal to the population of each county. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). In column 6, "APL × Post × Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	Employment in Non-Tradable Sector					
	Full Sample		*Counties with Elasticity Measure*			
						IV
APLg,t × Post × Fraction OCC	0.207***	0.161***	0.179**	0.179**	0.152**	
	(0.0698)	(0.0596)	(0.0707)	(0.0707)	(0.0714)	
Instrumented Log of Loan Amounts						0.220**
						(0.0987)
APLg,t × Post	-0.0696***	-0.0607***	-0.0715***	-0.0715***	-0.0642***	-0.00442
	(0.0222)	(0.0182)	(0.0210)	(0.0210)	(0.0212)	(0.00865)
Post × Fraction OCC	-0.191***	-0.103**	-0.0859	-0.0859	-0.0321	0.0211
	(0.0560)	(0.0448)	(0.0538)	(0.0538)	(0.0560)	(0.0403)
APLg,t × Fraction OCC	-0.171***	-0.0902*	-0.0637	-0.0637	-0.0589	-0.0133
	(0.0538)	(0.0482)	(0.0593)	(0.0593)	(0.0594)	(0.0562)
APLg,t	0.0544***	0.0343**	0.0286	0.0286	0.0264	0.0116
	(0.0172)	(0.0160)	(0.0193)	(0.0193)	(0.0191)	(0.0168)
Log(Median Income)		0.287***	0.310***	0.310***	0.273***	-0.0384
		(0.0443)	(0.0488)	(0.0488)	(0.0470)	(0.145)
Log(Population)		0.893***	0.954***	0.954***	0.965***	0.668***
		(0.0741)	(0.0814)	(0.0814)	(0.0815)	(0.164)
Fraction of Subprime × Post			0.101***	0.101***	0.128***	-0.110
			(0.0352)	(0.0352)	(0.0393)	(0.115)
Elasticity × Post					-0.00803***	0.00619
					(0.00298)	(0.00718)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,362	5,362	3,693	3,693	3,693	3,693
R-squared	0.014	0.226	0.287	0.287	0.291	0.150
Number of counties	790	790	537	537	537	537

Table 5.B

Preemption of National Banks and Boom-Bust in Employment in Non-Tradable Sector

The table reports coefficient estimates of WLS regressions relating the changes in employment in non-tradable sectors to the preemption of national banks and the increase in the supply of loans induced by the preemption, with weights equal to the population of each county. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)
	Change in Employment in Non-Tradable Sector in 2003-2005			*Change in Employment in Non-Tradable Sector in 2008-2010*		
$APLg_{,2004}$ × Fraction OCC	0.145**	0.181**	0.164**	-0.166**	-0.241**	-0.221**
	(0.0638)	(0.0752)	(0.0754)	(0.0746)	(0.0991)	(0.103)
$APLg_{,2004}$	-0.0511***	-0.0637***	-0.0582***	0.0525**	0.0717**	0.0664**
	(0.0192)	(0.0220)	(0.0221)	(0.0245)	(0.0318)	(0.0327)
Fraction OCC	-0.0770	-0.0843	-0.0551	0.0530	0.102*	0.0562
	(0.0471)	(0.0579)	(0.0600)	(0.0400)	(0.0565)	(0.0608)
Change in Median Income	0.139***	0.154***	0.117**	0.0391	0.0855	0.118
	(0.0486)	(0.0485)	(0.0508)	(0.105)	(0.125)	(0.125)
Change in Population	0.863***	0.944***	0.951***	0.319	0.386*	0.305
	(0.0893)	(0.0940)	(0.0934)	(0.216)	(0.234)	(0.221)
Fraction of Subprime		0.0823***	0.0968***		0.0622	0.0392
		(0.0307)	(0.0321)		(0.0425)	(0.0475)
Elasticity			-0.00460*			0.00658**
			(0.00276)			(0.00323)
Observations	755	525	525	760	531	531
R-squared	0.162	0.244	0.247	0.019	0.037	0.046

Table 6.A

Preemption of National Banks and Decline and Subsequent Increase in Mortgages Delinquencies

The table reports coefficient estimates of weighted least square regressions relating the percentage of delinquent mortgages to the preemption of national banks with weights equal to the population of each county. Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). In column 6, "APL X Post X Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	Delinquency Rates					
	Full Sample		*Counties with Elasticity Measure*			
APLg,t × Post × Fraction OCC	-0.874***	-0.869***	-1.830***	-1.830***	-1.580***	
	(0.328)	(0.309)	(0.442)	(0.442)	(0.435)	
Instrumented Log of Loan Amounts						-2.202***
						(0.613)
APLg,t × Post	0.402***	0.420***	0.715***	0.715***	0.649***	0.0399
	(0.107)	(0.101)	(0.139)	(0.139)	(0.137)	(0.0541)
Post × Fraction OCC	0.877***	0.683***	1.010***	1.010***	0.486*	-0.0751
	(0.190)	(0.178)	(0.280)	(0.280)	(0.272)	(0.251)
APLg,t × Fraction OCC	0.0596	-0.00465	0.347	0.347	0.283	-0.165
	(0.282)	(0.284)	(0.391)	(0.391)	(0.396)	(0.307)
APLg,t	-0.0520	-0.0435	-0.181	-0.181	-0.155	-0.0151
	(0.0943)	(0.0953)	(0.128)	(0.128)	(0.129)	(0.0886)
Log(Median Income)		-1.930***	-2.316***	-2.316***	-1.935***	1.216
		(0.325)	(0.372)	(0.372)	(0.421)	(0.904)
Log(Population)		-0.827*	-0.865*	-0.865*	-1.008**	1.839**
		(0.435)	(0.515)	(0.515)	(0.503)	(0.921)
Fraction of Subprime X Post			-0.843***	-0.843***	-1.113***	1.128
			(0.304)	(0.304)	(0.322)	(0.691)
Elasticity X Post					0.0834***	-0.0616
					(0.0221)	(0.0468)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,533	15,533	5,348	5,348	5,348	5,348
R-squared	0.007	0.022	0.074	0.074	0.086	-0.090
Number of counties	2,219	2,219	764	764	764	764

Table 6.B

Preemption of National Banks and Decline and Subsequent Increase in Mortgages Delinquencies

The table reports coefficient estimates of weighted least square regressions relating the change in delinquency rates to the preemption of national banks with weights equal to the population of each county. Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "$APLg_{,2004}$ is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)
	Change in Delinquency Rates in 2003-2005			*Change in Delinquency Rates in 2008-2010*		
$APLg_{,2004}$ × Fraction OCC	-0.887**	-1.924***	-1.841***	2.367	7.841**	5.767*
	(0.347)	(0.497)	(0.500)	(2.150)	(3.797)	(3.358)
$APLg_{,2004}$	0.435***	0.747***	0.720***	-1.031	-2.897**	-2.371**
	(0.114)	(0.156)	(0.156)	(0.828)	(1.298)	(1.137)
Fraction OCC	0.727***	1.353***	1.199***	-7.556***	-13.07***	-7.723***
	(0.231)	(0.350)	(0.361)	(1.810)	(3.160)	(2.638)
Change in Median Income	-1.455***	-1.713***	-1.505***	3.798**	4.318	0.938
	(0.342)	(0.376)	(0.413)	(1.598)	(2.783)	(2.531)
Change in Population	-1.460***	-1.222**	-1.270**	-24.99***	-29.90***	-19.65***
	(0.534)	(0.571)	(0.564)	(5.305)	(6.613)	(5.471)
Fraction of Subprime		-1.082***	-1.163***		2.604*	5.395***
		(0.233)	(0.251)		(1.375)	(1.420)
Elasticity			0.0263			-0.818***
			(0.0193)			(0.108)
Observations	2,214	760	760	2,214	760	760
R-squared	0.037	0.165	0.167	0.115	0.206	0.339

Table 7

Heterogeneous Effects I: Subprime Regions

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Subprime counties are defined as counties with the fraction of subprime borrowers (FICO <680) in the top tercile, while prime counties are the others. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. In all columns, we control for changes in median income, population and for the elasticity measure. Other interactions are omitted. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in Loan Amount in 2003-2005	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
Subprime County × $APLg_{,2004}$ × Fraction OCC	1.344***	-1.779***	0.566*	-1.145***	0.288**	-0.354*	-2.066*	16.99***
	(0.363)	(0.678)	(0.314)	(0.316)	(0.136)	(0.205)	(1.080)	(6.384)
Prime County × $APLg_{,2004}$ × Fraction OCC	0.342	-0.279	0.183	-0.143	0.0847	-0.164	-1.413***	-0.237
	(0.241)	(0.308)	(0.227)	(0.144)	(0.0910)	(0.105)	(0.542)	(3.203)
Observations	760	760	539	539	525	531	760	760
R-squared	0.443	0.289	0.529	0.341	0.243	0.049	0.154	0.362

Table 8

Heterogeneous Effects II: House Affordability

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Counties with least affordable housing are defined as those with the ratio of median house prices to median income in the top tercile, while the counties with most affordable housing are those in the other terciles. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. In all columns, we control for changes in median income, population, for the fraction of subprime borrowers and for the elasticity measure. Other interactions are omitted. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in Loan Amount in 2003-2005	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
Least Affordable Housing × $APLg_{,2004}$ × Fraction OCC	2.392**	-6.289**	0.379	-1.649***	0.518***	0.299	-7.399***	52.02***
	(1.178)	(2.649)	(0.617)	(0.575)	(0.187)	(0.392)	(2.187)	(16.48)
More Affordable Housing × $APLg_{,2004}$ × Fraction OCC	0.845**	-0.865**	0.209	-0.360	0.0784	-0.0420	-1.954**	9.125*
	(0.368)	(0.428)	(0.270)	(0.275)	(0.101)	(0.0960)	(0.804)	(4.958)
Observations	440	440	397	397	372	376	440	440
R-squared	0.430	0.312	0.522	0.266	0.262	0.036	0.231	0.403

Table 9

Heterogeneous Effects III: Elasticity of Housing Supply

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Inelastic counties are those with the measure of elasticity of housing supply provided by Saiz (2010) in the lowest tercile, while elastic counties are those in the other terciles. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. In all columns, we control for changes in median income and population, for the fraction of subprime borrowers and for the elasticity measure. Other interactions are omitted. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in Loan Amount in 2003-2005	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
Inelastic County × $APLg_{,2004}$ × Fraction OCC	1.478**	-3.283**	0.994*	-1.444***	0.275	-0.562*	-0.115	24.91*
	(0.663)	(1.557)	(0.599)	(0.388)	(0.212)	(0.305)	(1.553)	(12.78)
Elastic County × $APLg_{,2004}$ × Fraction OCC	0.731***	-0.578**	0.322*	-0.301	0.198**	-0.143*	-2.132***	4.306
	(0.246)	(0.264)	(0.188)	(0.228)	(0.0881)	(0.0816)	(0.554)	(3.113)
Observations	765	765	540	540	528	534	765	765
R-squared	0.396	0.262	0.521	0.275	0.251	0.075	0.139	0.392

Table 10

Robustness Test I: Securitization

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county, controlling for the fraction of loans that in each county were securitized. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. Fraction of Securitized loans come from BlackBox Logic, which covers 90% of the securitization market. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). In the odd columns we include the change in the fraction of loans securitized between 2003 and 2005, while in the even columns we control for the change in the fraction of loans securitized between 2002 and 2006. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in Loan Amount in 2003-2005	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
$APLg_{,2004}$ × Fraction OCC	0.747***	-0.880***	0.323**	-0.524***	0.165**	-0.227**	-1.840***	6.354**
	(0.191)	(0.319)	(0.156)	(0.147)	(0.0740)	(0.0985)	(0.504)	(2.948)
$APLg_{,2004}$	-0.333***	0.297***	-0.165***	0.200***	-0.0596***	0.0703**	0.717***	-2.687***
	(0.0610)	(0.109)	(0.0487)	(0.0472)	(0.0215)	(0.0309)	(0.158)	(0.990)
Fraction OCC	-0.326**	0.888***	-0.128	0.367***	-0.0544	0.0453	1.199***	-7.143***
	(0.142)	(0.207)	(0.118)	(0.127)	(0.0590)	(0.0543)	(0.366)	(1.999)
Change in Median Income	1.254***	1.047***	1.122***	0.125	0.0883	0.169	-1.555***	-1.944
	(0.161)	(0.308)	(0.127)	(0.152)	(0.0558)	(0.119)	(0.408)	(2.468)
Change in Population	1.811***	0.651	0.601***	0.481	0.927***	0.280	-1.302**	-17.10***
	(0.253)	(0.565)	(0.175)	(0.312)	(0.0946)	(0.210)	(0.553)	(5.644)
Elasticity	-0.0228***	0.0470***	-0.0255***	0.00142	-0.00100	-0.00158	0.0324	-0.283***
	(0.00812)	(0.0172)	(0.00717)	(0.00544)	(0.00303)	(0.00332)	(0.0220)	(0.0896)
Fraction of Subprime	0.545***	-0.715***	-0.00131	0.0267	0.0729**	0.0923*	-1.201***	2.164**
	(0.0932)	(0.152)	(0.0675)	(0.0648)	(0.0330)	(0.0482)	(0.249)	(1.088)
Securitization boom between 2003-2005	0.790***		0.758***		0.0972***		0.167	
	(0.127)		(0.104)		(0.0337)		(0.291)	
Securitization boom between 2002-2006		-0.339		-0.612***		-0.136***		9.077***
		(0.240)		(0.0834)		(0.0362)		(1.508)
Observations	759	759	539	539	525	531	759	759
R-squared	0.520	0.294	0.623	0.489	0.255	0.078	0.168	0.468

Table 11

Robustness Test II: Difference-in-Differences

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county, restricting attention only to the states that implemented an anti-predatory law by 2004. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results are for years 2000 to 2006. All regressions are weighted using the total number of households in a county as weights. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)
	Log of Loan amount	*House Prices Growth*	*Employment in Non-Tradable Sector*	*Delinquency Rates*
Post × Fraction OCC	0.519***	0.146**	0.128**	-0.978**
	(0.138)	(0.0620)	(0.0614)	(0.398)
APLg,t × Fraction OCC	-0.146	-0.148**	-0.0698	0.618
	(0.150)	(0.0725)	(0.0580)	(0.424)
APLg,t	0.0343	0.0506**	0.0296*	-0.234*
	(0.0462)	(0.0212)	(0.0180)	(0.134)
Fraction of Subprime × Post	0.868***	0.187***	0.0448	-1.147**
	(0.156)	(0.0531)	(0.0520)	(0.577)
Elasticity × Post	-0.0370**	-0.0125**	-0.00632	0.127***
	(0.0148)	(0.00605)	(0.00469)	(0.0458)
Log(Median Income)	1.555***	0.214***	0.327***	-2.895***
	(0.193)	(0.0608)	(0.0623)	(0.629)
Log(Population)	1.126***	0.251***	0.950***	-0.349
	(0.230)	(0.0644)	(0.0748)	(0.715)
Fraction Securitized Loans	0.656***	-0.0431	0.0948*	1.004***
	(0.142)	(0.0527)	(0.0516)	(0.375)
Year Fixed Effect	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes
Observations	2,359	1,820	1,719	2,359
R-squared	0.507	0.128	0.434	0.131
Number of counties	337	260	252	337

Table 12

Robustness Test III: State Borders

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, and house prices to the preemption of national banks, with weights equal to the population of the census tract. We restrict attention to tracts within 10 miles from state borders. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at census tract level for each year. House prices are from CoreLogic. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003 at the census tract level. In all columns, we control for state-fixed effects and for state-border fixed effects. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4
	Change in Loan Amount in 2003-2005	*Change in House Prices in 2003-2005*	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2008-2010*
APLg,t × Fraction OCC	0.290***	0.232***	-0.265**	-0.0516**
	(0.0994)	(0.0444)	(0.116)	(0.0248)
APLg,t	-0.0880***	-0.0796***	-0.00993	-0.00959
	(0.0318)	(0.0135)	(0.0387)	(0.00856)
Fraction OCC	-0.0204	0.00450	0.261***	0.0319
	(0.0625)	(0.0200)	(0.0736)	(0.0228)
Change in County Median Income	0.511***	0.644***	-0.248	-0.352***
	(0.146)	(0.0901)	(0.164)	(0.0517)
Observations	11,587	7,525	11,404	7,514
R-squared	0.114	0.369	0.158	0.402

Table 13

Robustness Test IV: CRA Lending

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated Community Reinvestment Act (CRA) loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. The dependent variable in columns 1 and 2 is the change in CRA lending for the boom and the bust period, aggregated at the county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. For columns 3-8 we control for the change in CRA lending at the county level. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in CRA Lending in 2003-2005	*Change in CRA Lending in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
APLg,t × Fraction OCC	-1.147***	-0.192	0.279	-0.474***	0.139*	-0.214*	-1.683***	4.580
	(0.274)	(0.253)	(0.198)	(0.183)	(0.0772)	(0.110)	(0.522)	(3.034)
Change in CRA lending			-0.0208	0.115***	-0.0120	0.0299*	0.118*	-3.221***
			(0.0255)	(0.0290)	(0.00972)	(0.0160)	(0.0687)	(0.455)
APLg,t	0.373***	0.0600	-0.144**	0.176***	-0.0506**	0.0634*	0.674***	-2.054**
	(0.0853)	(0.0891)	(0.0636)	(0.0599)	(0.0226)	(0.0348)	(0.162)	(1.026)
Fraction OCC	0.0214	0.720***	-0.129	0.357**	-0.0427	0.0492	1.172***	-6.057**
	(0.178)	(0.199)	(0.143)	(0.169)	(0.0603)	(0.0643)	(0.370)	(2.465)
Change in Median Income	0.259	0.172	1.254***	-0.206	0.0972*	0.106	-1.368***	0.939
	(0.235)	(0.189)	(0.164)	(0.180)	(0.0511)	(0.124)	(0.413)	(2.315)
Change in Population	0.414*	-0.146	0.730***	0.748**	0.970***	0.352	-1.210**	-23.50***
	(0.218)	(0.468)	(0.210)	(0.315)	(0.0949)	(0.224)	(0.572)	(5.372)
Elasticity	-0.0628***	0.0631***	-0.0644***	0.0337***	-0.00712**	0.00434	0.0429**	-0.647***
	(0.0119)	(0.00845)	(0.00971)	(0.00573)	(0.00299)	(0.00336)	(0.0205)	(0.0999)
Fraction of Subprime	-0.380**	-0.390***	0.217***	-0.179**	0.0902***	0.0635	-1.128***	3.844***
	(0.154)	(0.122)	(0.0794)	(0.0778)	(0.0329)	(0.0481)	(0.258)	(1.215)
Observations	734	736	523	526	510	518	734	736
R-squared	0.204	0.218	0.538	0.329	0.253	0.055	0.173	0.444

Table 14

Robustness Test V: Bank Holding Companies Agency

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. Fraction of Securitized loans come from BlackBox Logic, which covers 90% of the securitization market. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003, where we assign to OCC all the subsidiaries of the bank holding company if in the bank holding company there is at least a subsidiary regulated by OCC. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. In the odd columns we include the change in the fraction of loans securitized between 2003 and 2005, while in the even columns we control for the change in the fraction of loans securitized between 2002 and 2006. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Change in Loan Amount in 2003-2005	*Change in Loan Amount in 2007-2009*	*Change in House Prices in 2003-2005*	*Change in House Prices in 2008-2010*	*Change in Employment in Non-Tradable Sector in 2003-2005*	*Change in Employment in Non-Tradable Sector in 2008-2010*	*Change in Delinquency Rates in 2003-2005*	*Change in Delinquency Rates in 2008-2010*
APLg,t × Fraction OCC	0.723***	-0.851***	0.340*	-0.518***	0.157**	-0.220**	-1.807***	5.769*
	(0.197)	(0.314)	(0.191)	(0.182)	(0.0749)	(0.103)	(0.501)	(3.351)
APLg,t	-0.314***	0.282***	-0.161***	0.191***	-0.0557**	0.0660**	0.705***	-2.376**
	(0.0633)	(0.106)	(0.0614)	(0.0597)	(0.0220)	(0.0327)	(0.157)	(1.136)
Fraction OCC	-0.317**	0.904***	-0.136	0.417**	-0.0485	0.0567	1.173***	-7.780***
	(0.148)	(0.210)	(0.141)	(0.169)	(0.0595)	(0.0610)	(0.361)	(2.635)
Change in Median Income	1.482***	1.145***	1.318***	-0.168	0.116**	0.116	-1.456***	0.944
	(0.165)	(0.327)	(0.163)	(0.178)	(0.0506)	(0.124)	(0.414)	(2.511)
Change in Population	1.968***	0.841	0.741***	0.624*	0.953***	0.309	-1.301**	-19.62***
	(0.262)	(0.518)	(0.208)	(0.324)	(0.0935)	(0.220)	(0.566)	(5.449)
Elasticity	-0.0520***	0.0667***	-0.0568***	0.0414***	-0.00470*	0.00654**	0.0272	-0.816***
	(0.00802)	(0.0149)	(0.00893)	(0.00531)	(0.00277)	(0.00323)	(0.0193)	(0.108)
Fraction of Subprime	0.727***	-0.820***	0.221***	-0.251***	0.0975***	0.0396	-1.166***	5.398***
	(0.0981)	(0.184)	(0.0796)	(0.0772)	(0.0321)	(0.0476)	(0.252)	(1.416)
Observations	764	764	543	543	528	534	764	764
R-squared	0.461	0.281	0.529	0.283	0.245	0.046	0.164	0.340

Table 15
Long-Run Effects

The table reports coefficient estimates of weighted least square regressions relating the changes in the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county for the 2003-2010 period. We control for the fraction of loans that in each county were securitized, the elasticity of housing supply as provided by Saiz (2010), changes in population and median income and for the fraction of subprime borrowers in each county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)
	Change in Loan Amount in 2003-2010	*Change in House Prices in 2003-2010*	*Change in Employment in Non-Tradable Sector in 2003-2010*	*Change in Delinquency Rates in 2003-2010*
APLg,t × Fraction OCC	-0.654*	-0.0230	-0.0801	11.68*
	(0.374)	(0.246)	(0.134)	(6.500)
Observations	769	545	527	769
R-squared	0.458	0.439	0.315	0.604

Table 16

Preemption of National Banks and the Amount of Loans Issued Under Each Regulatory Agency

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated loans under each regulatory agency to the preemption of national banks with weights equal to the population of each county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated for each regulatory agency at county level for each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "OCC" is equal to one if the regulating agency is OCC. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3
	Log of loan amount	*Log (Loan Amounts / Loan Amounts in 2000)*	
APLg,t × Post × OCC	0.09***	0.11***	0.11***
	(0.03)	(0.03)	(0.03)
OCC × Post	-0.07***	-0.09***	-0.09***
	(0.02)	(0.02)	(0.02)
APLg,t × OCC	-0.01	-0.00	-0.00
	(0.02)	(0.02)	(0.02)
APLg,t × Post	-0.09***	-0.10***	
	(0.02)	(0.02)	
OCC		0.05***	0.05***
		(0.01)	(0.01)
APLg,t	-0.01	-0.01	
	(0.02)	(0.02)	
County-Agency Fixed Effects	Yes		
Year Fixed Effects	Yes	Yes	
County Fixed Effects		Yes	
County-Year Fixed Effects			Yes
Observations	90,957	89,170	89,170
R-squared	0.98	0.34	0.33

Table 17

Robustness Test VI: Anti-Predatory Laws, National Banks and the Amount of High Cost Loans

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated high cost loans under OCC lenders and non-OCC lenders to the passage of Anti-Predatory laws and the regulatory agency of loan originator. Loan amounts is based on HMDA and is the amount of high cost loans -loans with more than three percent spread rate - originated for purchasing a house aggregated for each regulatory agency at the county level for each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "OCC" is equal to one if the regulating agency is OCC. The sample includes years from 2004 to 2007 (HMDA does not report high-cost loans before 2004). Robust standard errors, clustered at the county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)
	Log of loan amount	*Log (Loan Amounts / Loan Amounts in 2004)*	
APLg,t × OCC	0.39***	0.17***	0.17***
	(0.07)	(0.05)	(0.05)
APLg,t	-0.13*	-0.10*	
	(0.07)	(0.06)	
Year Fixed Effects	Yes	Yes	
County Fixed Effects		Yes	
Agency Fixed Effects		Yes	Yes
County-Agency Fixed Effects	Yes		
County-Year Fixed Effects			Yes
Observations	85,328	51,312	51,312
R-squared	0.91	0.48	0.53

Table 18

Robustness Test VII: Anti-Predatory Laws, National Banks and Loans with High DTI Ratio

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated loans with debt-to-income in the top decile by OCC lenders and non-OCC lenders to the passage of Anti-Predatory laws and the regulatory agency of loan originator. Loan amounts is based on HMDA and is the amount of loans in the top decile of debt-to-income ratio originated by each agency in each year. "$APL_{g,t}$" is equal to 1 if state *g* has an anti-predatory-lending law in place at time *t* and zero otherwise. "OCC" is equal to one if the regulating agency is OCC. The sample includes years from 2000 to 2006. Robust standard errors, clustered at the county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)
	Log of loan amount	*Log (Loan Amounts/ Loan Amounts in 2000)*	
APLg,t × OCC × Post	0.09**	0.18***	0.18***
	(0.04)	(0.05)	(0.06)
County-Agency Fixed Effects	Yes		
Year Fixed Effects	Yes	Yes	
County Fixed Effects		Yes	
County-Year Fixed Effetcs			Yes
Observations	73,700	99,976	99,976
R-squared	0.96	0.37	0.51